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**SAN FRANCISCO BAY AREA
RAPID TRANSIT DISTRICT**

**CAPITAL IMPROVEMENT
PROGRAM**

JULY 1996 THROUGH JUNE 2006
(FY 1997 - FY 2006)

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Draft -- August 22, 1996

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1997 - 2006

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration, under the Federal Transit Laws, 49 U.S.C. Chapter 53, and passed through the Metropolitan Transportation Commission. This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART, which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

August 1996

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CHAPTER 1

CONTEXT AND ORGANIZATION OF THE PROGRAM

Context of the Program

BART faces enormous challenges as it prepares to enter the 21st Century with this *Capital Improvement Program*. The District is preparing to start work on a billion dollar extension to the San Francisco International Airport, while at the same time undertaking an unprecedented program of rehabilitating and upgrading the existing system, and improving system accessibility -- all while maintaining and even improving the level of service provided.

An Aging System: The System Renovation Program

When BART initiated service in 1972, it was state-of-the-art: the most modern, most automated rail transit system in the world. Now, more than two decades later, BART is no longer the same sparkling new system. Recognizing this fact, in 1995 and 1996, BART began a major program of system renovation to ensure that service does not deteriorate in the future.

BART now carries twice as many passengers daily than in its early years, patronage is still growing, and the equipment is aging. This combination puts the BART system at risk if the District is not able to continue implementing its renovation program expeditiously. Most of the hardware that comprises the BART rail system will reach the end of its operational lifetime over the next few years unless it is rebuilt, reconditioned, or replaced. Renovation funding requirements are generated from a planned replacement cycle based on useful life. Examples of the aging of the BART system include:

- ◆ the typical BART railcar has accumulated over a million miles of travel;
- ◆ the doors on a typical car have cycled more than three million times;
- ◆ nearly a billion people have been transported in these vehicles, used the farecard vendors, activated the faregates, and ridden the escalators or walked the stairs;
- ◆ many of the electronic and computer systems which heralded a new era of rail transit technology a generation ago are now becoming obsolete, and therefore increasingly difficult and expensive to maintain.

This onset of aging makes it essential for BART to rebuild before it experiences the declining spiral of effects that many older rail transit systems have suffered due to their inability to attend to preventative maintenance and renovation in a timely manner. This

is not glamorous, high-visibility work, and it is very expensive. But it is essential, and in the long run ***it is much more cost effective to rehabilitate systems before reaching the point of failure than to try to fix problems after they become obvious.*** This will also avoid future degradation of service and consequent loss of patronage and fare revenue.

BART must not only maintain its current level of service while undergoing both expansion and rebuilding, but also provide even higher levels of service to meet the needs of a growing market. To provide reliability at higher levels of service, this *Capital Improvement Program* reflects the need for major renovation for stations; transit vehicles; train control, power, and communications systems; maintenance facilities; and many other parts of the BART physical plant.

A Growing System: Planned Growth and New Services

BART system patronage is expected to continue to grow in the future, both in terms of real growth on the existing core system and as a result of the opening of additional line segments and stations. Patronage is projected to grow 36.6 percent over the term of this ten year planning horizon, from 72.1 million trips in 1995/1996 to 100.6 million trips in 2005/2006. This will require additional facilities and capabilities. While BART invested heavily in increasing its people-carrying capacity over the last ten years, continued growth in patronage will require continued capacity expansion. In order to accommodate forecast growth, this capital program calls for improved facilities for feeder bus access; more reliable escalator, elevator and fare processing equipment; an advanced system of automatic train control to increase the frequency of train service; and additional maintenance facility capacity.

BART has completed a program of significant expansion of patron parking over the past few years. In the early 1990s, BART added more than 2,300 spaces at existing stations. Although demand for station parking continues to be a significant need, funding is not expected to be available for additional parking expansion in the foreseeable future. Over the next few years BART's station access improvement program will focus on grant-funded "intermodal" bus access projects. These projects, several of which are already underway, will increase the capacity to handle more feeder buses at the stations, along with providing more comfortable amenities for patrons who transfer to and from buses at BART stations. In addition, a highly innovative grant-funded demonstration program just getting underway involves a test of electric "station cars" as one more possible means of improving connections at both ends of BART rail trips.

Replacement of worn and unreliable escalators, elevators, and deteriorating farecard vending equipment and faregates, along with other station renovation projects

and implementation of better interoperator fare mechanisms, will improve the flow of patrons through the stations, while providing increased customer convenience.

The first phase of BART's extensions to the rail system is moving forward rapidly. The line extensions and new stations at Colma and North Concord/Martinez both opened in the winter of 1995/1996. The further extension from North Concord/Martinez to Pittsburg/Bay Point is planned to open in late 1996, and the new line to Castro Valley and Dublin/Pleasanton are forecast to open in 1997. Substantial progress is being made in the planning, design, and funding of the proposed extension from the new Colma Station to San Francisco International Airport. Initial construction of that billion dollar project is planned to begin in late 1996.

The District remains committed to the planned Phase 2 and 3 extensions of BART rail service to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. Anticipated funding limitations during the next ten years will almost certainly push their completion beyond that time frame. As a near-term interim solution, a network of commuter rail service using conventional diesel locomotives and standard passenger railcars could be placed into service in these same extension corridors at much lower costs and within two years of funding approval.

An Accessible System: Americans With Disabilities Act Compliance

The BART system has been hailed as a model of public transit accessibility for persons who are elderly and/or disabled, ever since the system began operation. To this day BART remains one of the most accessible rail systems in the world. But the federal Americans With Disabilities Act (ADA) has set even more comprehensive standards than those currently offered by BART or any other rail transit agency in the world. BART is moving aggressively to implement projects necessary to come into compliance with the new regulations.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Shop & Yards
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project has been assigned a priority level, independent from its funding availability status. These priorities are outlined in Chapter 3 (Funding Needs--Project Priorities). Priorities range from a high of 1 to a low of 5, based on law and regulation; or degree of criticality to safety, reliability of service, maintenance operations, operation of the extensions, and service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted, or essential to ensure operation performance of the extensions lines.
- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted, or introduction of

technological advancements which significantly improve operational performance or result in significant cost efficiencies.

- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed, District goals will not be achieved.
- 4 Routine replacement of worn or obsolescent equipment or systems, desirable system improvements, or reduced maintenance costs.
- 5 Identified need, but no near-term future cost or service impact.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the risk to operations, safety, or impact on operating costs.

Funding Availability Status

This ten-year *Capital Improvement Program (CIP)* lists all of the projects which the District would implement if adequate funding were available. The entire program totals \$6.8 billion and has a remaining funding need of \$5 billion (a summary of the entire capital program is displayed on page 11). A program of this size is currently beyond the level of funding which can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks", into which projects are assigned, based on the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects that are essential to continued safe and reliable operation of the system, and for which funding can be identified with a reasonable degree of probability. Track Two includes projects for which the projected future levels of existing funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future, and/or the creation of new funding sources. Page 12 presents a summary of overview of the two tracks. See Chapter 2 (Funding Strategy) for more information on funding availability for various programs.

Summary of Funding Needs by Program Area

BART FY1997-2006 Capital Improvement Program

Program Areas	Total Cost*	Funding to date	Funding Req't.*	Fiscal Year Need*				
				1997	1998	1999	2000	2001-2002-06
I. Systemwide Renovation								
A. Rolling Stock	485,148	290,924	194,224	16,068	19,600	20,877	50,663	61,114
B. Mainline	103,798	22,700	81,098	3,583	13,045	16,490	21,700	8,300
C. Stations	210,123	42,631	167,492	20,330	43,479	18,647	28,175	12,410
D. Controls & Communication	189,832	97,323	92,509	16,449	51,435	7,595	7,782	8,998
E. Shops & Yards	148,604	10,568	138,036	3,016	23,275	8,655	6,940	3,750
F. Work Equipment	29,870	350	29,520	2,845	5,990	4,575	2,985	3,930
Subtotal	1,167,375	464,496	702,879	62,291	156,824	76,640	118,245	98,502
II. Extensions								
A. Phase 1 Extensions	2,756,590	1,208,790	1,547,800	1,061,000	0	486,800	0	0
B. Oakland Airport Connector	149,600	1,125	148,475	5,000	0	143,475	0	0
C. W. Dublin/Pleasanton Station	33,000	0	33,000	0	33,000	0	0	0
D. Pittsburg-Bay Point to Railroad Ave.	200,000	96,000	104,000	0	0	0	0	104,000
E. Phase 2 & 3 Extensions	TBD	3,295	TBD	TBD	TBD	TBD	TBD	TBD
F. Commuter Rail System	TBD	0	TBD	TBD	TBD	TBD	TBD	TBD
Subtotal	3,139,190	1,309,210	1,833,275	1,066,000	33,000	630,275	0	104,000
III. Seismic Retrofit	231,360	1,215	230,145	0	7,475	28,620	25,150	25,900
IV. Service Improvements								
A. Current Planned Expansion	216,107	23,157	192,950	405	45,350	79,695	3,790	210
B. Additional Capacity Enhancement	2,000,000	0	2,000,000	0	0	0	0	0
Subtotal	2,216,107	23,157	2,192,950	405	45,350	79,695	3,790	210
V. Research, Development & Demonstr.	TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD
VI. Other Capital Obligations	63,280	0	63,280	35,780	27,500	0	0	0
GRAND TOTALS	6,817,312	1,801,393	5,022,929	1,164,476	270,149	815,230	147,185	124,612

NOTES:

- * All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.
- * All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

Summary of Funding Needs by Funding Availability Status

BART FY1997-2006 Capital Improvement Program

Funding Status and BART Priority	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001-2002-06
Track One--Financially Constrained								
Priority 1								
Systemwide Renovation Program	824,825	433,875	390,950	40,727	107,584	34,460	74,953	71,214
Phase I Extensions Program	2,581,690	1,208,790	1,372,900	1,061,000	0	311,900	0	0
SUBTOTAL	3,406,515	1,642,665	1,763,850	1,101,727	107,584	346,360	74,953	71,214
Priority 2								
Systemwide Renovation Program	219,395	22,821	196,774	21,564	35,480	31,165	30,812	26,378
Service Improvement Program	20,442	192	20,250	TBD	13,250	7,000	0	0
Research, Development & Demonstration	TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD
SUBTOTAL	239,837	26,128	217,024	21,564	48,730	38,165	30,812	26,378
Other Capital Obligations	63,280	0	63,280	35,780	27,500	0	0	0
Track One Subtotal	3,709,632	1,668,793	2,044,154	1,159,071	183,814	384,525	105,765	97,592
								113,387
Track Two--Unconstrained								
Priority 1								
Warm Springs unfunded Track Two portion	174,900	0	174,900	0	0	174,900	0	0
Oakland Airport Connector	149,600	1,125	148,475	5,000	0	143,475	0	0
Pittsburg-BayPoint to Pittsburg-Railroad, Ave.	200,000	96,000	104,000	0	0	0	0	104,000
W. Dublin-Pleasanton Station	33,000	0	33,000	0	33,000	0	0	0
Commuter Rail System	TBD	0	TBD	0	0	0	0	0
SUBTOTAL	557,500	97,125	460,375	5,000	33,000	318,375	0	104,000
Priority 2								
Phase 2 & 3 Extensions	TBD	3,295	TBD	TBD	TBD	TBD	TBD	TBD
Seismic Retrofit Program	231,360	1,215	230,145	0	7,475	28,620	25,150	25,900
Service Improvement Program	97,750	0	97,750	0	0	34,250	0	63,500
SUBTOTAL	329,110	4,510	327,895	0	7,475	62,870	25,150	25,900
Priority 3								
Systemwide Renovation Program	91,005	0	91,005	0	7,505	5,070	885	635
Service Improvement Program	97,915	22,965	74,950	405	32,100	38,445	3,790	210
Add'l Capacity Enhancement Program	2,000,000	0	2,000,000	0	0	0	0	2,000,000
SUBTOTAL	2,188,920	22,965	2,165,955	405	39,605	43,515	4,675	845
Priority 4	28,470	8,000	20,470	0	5,845	5,945	8,325	275
Priority 5	3,680	0	3,680	0	410	0	3,270	0
Track Two Subtotal	3,107,680	132,600	2,978,375	5,405	86,335	430,705	41,420	27,020
								2,387,490
GRAND TOTALS	6,817,312	1,801,393	5,022,529	1,164,476	270,149	815,230	147,185	124,612
								2,500,877

CHAPTER 2

FUNDING STRATEGY

Funding Strategy Background

BART's capital improvement funding strategy is shaped by two important Metropolitan Transportation Commission (MTC) resolutions which provide foundations for both the system renovation and system extensions programs.

System Renovation and MTC Resolution 2672

Track One System Renovation

BART's full system renovation program totals just over a billion dollars over the next ten years. In May 1994, BART and the Metropolitan Transportation Commission (MTC) jointly adopted a cooperative funding program (MTC Resolution 2672) to address BART's most critical system renovation needs. This agreement calls for MTC to program \$450.8 million in federal, state, and bridge toll funds for BART renovation, and for BART to internally generate \$200.5 million as local match to the proposed grant funds. In fact, BART will have to generate substantially more than that amount in order to fund essential renovation projects beyond the scope of the BART-MTC agreement, and to provide interim funding prior to all of the external grant sources becoming available. The BART Track One System Renovation program includes all of the Priority 1 and Priority 2 projects listed in the System Renovation program areas, a detailed listing of which is shown on pages 25 through 33.

The funding plan originally set forth as part of Resolution 2672 anticipated MTC being able to program their entire \$450.8 million commitment over the period FY 1994 through FY 2000. Recent reductions in Congressional appropriations of transit system funding have led MTC to change their forecast of funds expected to be available to the region over the ten year period of this CIP. MTC's current funding projections for BART include an extension of the period for commitment of the agreed upon funds for BART system renovation. Programming of Section 3 funds for renovation of the A- and B-cars is extended from 2000 to 2004, and programming of Section 9 funds for other system renovation is extended beyond the ten-year period of this CIP. MTC has acknowledged the impact that this would have on BART, and has assured the District that this situation in no way reduces their commitment to the overall intent of the resolution. BART and MTC are currently discussing possible approaches to resolving this problem of grant timing.

As a result of these changes in programmed funding, in addition to increased BART capital program costs, this draft CIP indicates a shortfall in capital funding for the Track One program totaling \$103.5 million over the next ten years (see Funding Sources table on page 23). BART and MTC will work together closely to close this gap prior to completing the final CIP document.

Track Two System Renovation

With the funding strategy outlined above, and assuming BART and MTC are successful in closing the remaining Track One funding gap described above, the essential components of the planned system renovation program can be included in Track One. Funding cannot yet be identified for the Track Two System Renovation program, which totals an additional \$115.2 million in projects identified as Priority 3, 4, or 5. These projects form part of the basis for continuing advocacy for increased transit funding levels.

System Extensions and MTC Resolution 1876

Track One Extensions

MTC Resolution 1876 provides the regional priorities and basic financial plan for new rail starts and system extensions throughout the greater Bay Area. For the BART system extensions program, full funding is programmed for completion of the Pittsburg-Bay Point and Dublin-Pleasanton extension projects. A Full Funding Grant Agreement for the extension to San Francisco International Airport is currently being negotiated, and is anticipated in the fall of 1996. All of these projects are therefore included in Track One. The Warm Springs extension is listed as a Track One project on the basis of Resolution 1876 regional priorities, but only partial funding has been programmed to date.

Track Two Extensions

The remaining funding requirements for Warm Springs, and for other planned extension projects, remains uncertain at this time and therefore are included in Track Two.

Funding Strategy by Program Area

System Renovation

A and B Car Renovation

Together with system extensions, renovation of the over 24-year-old BART system is at the heart of BART's capital program. The largest single component of system renovation is rebuilding the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort, which is included in Track One, is \$475.9 million, including a pro-rated share of the cost of "float" cars. Under the float car program, newly purchased C-2 cars will be used to maintain operating fleet size while A- and B-cars are taken out of service for renovation.

The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in FTA Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in Bridge Toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$165.5 million.

In January of 1995 the BART Board of Directors approved a series of three fare increases to generate funds for system renovation, among other needs. A bond issue made in May 1995, and another planned for the spring of 1997, both of which are backed by the already approved fare increases, will provide the first increments of the \$165.5 million that BART must contribute for car renovation. Future bond issues, backed by future operating revenue, could provide the balance of BART's share.

Other System Renovation

Including other System Renovation program elements, the Track One BART system renovation program funding needs total approximately \$587.7 million. The current forecast of grant funding likely to be become available for non-vehicle system renovation includes \$52.3 million in Section 9 funds and \$6 million in state TCI funds. BART also anticipates receiving approximately \$37.6 million in non-traditional transit funding dedicated to the Advanced Automatic Train Control (AATC) project, which is part of the Track One program of renovation projects. See page 23, Funding Sources.

BART will need to supplement these anticipated grant funds. Since 1994/1995, the District has included future bond issues planned for 1998 and 1999, and their associated debt service, in the base financial case of the Short Range Transit Plan. These bond issues, backed by future operating revenues, could provide \$192 million above the revenue from the first two, funded bond issues. As noted above, BART and MTC will be working to close the remaining \$103.5 million gap in the Track One funding forecast prior to the final CIP. Other lower priority renovation projects are included in Track Two.

Extensions Program

Castro Valley and Dublin/Pleasanton

This two-station extension is fully funded with all programmed project revenues currently executed in funding agreements with state and local agencies, therefore this project is included in Track One. BART will continue seeking funding unrelated to the MTC Resolution 1876 regional agreement, for completion of the third station at West Dublin-Pleasanton. Local jurisdictions in the Tri-Valley area are investigating the possibility of transportation impact development fees as one potential source of partial funding for this third station.

North Concord/Martinez and Pittsburg/Bay Point

This extension is considered fully funded for two stations, assuming all programmed funding is realized as currently planned, therefore this project is included in Track One. This programmed funding includes some project revenues available per the BART-SamTrans Agreement, which are contingent upon the San Francisco International Airport extension being approved for construction. Funding is also programmed in the Contra Costa Transportation Authority's Measure C Expenditure Plan which could provide partial funding through Measure C sales tax revenues for continuation of the extension to Railroad Avenue.

San Francisco International Airport

The proposed extension from the newly opened Colma Station to San Francisco International Airport, with intermediate stations, is currently estimated to cost \$1.167 billion for the Locally Preferred Alternative. This is a Track One project. The funding plan for the project is comprised of a total \$750 million in federal Section 3 "New Starts" funding, \$99 million total from the recently executed Amendment to the BART-SamTrans Agreement, \$108 million total state funds, \$10 million in MTC-allocated bridge tolls, as well as an additional \$200 million to be funded by the Airport itself.

Oakland Airport Connector

BART is competing for funding for development and implementation of the Oakland Airport Connector using Suspended Light Rail Transit (SLRT) technology under a special federal demonstration funding program for this type of project. If the FTA selects the District to continue with the project, the next step in the process is completion of an EIR/EIS and preliminary engineering, for which \$4 million in additional federal funds are currently being sought. If this funding is realized, BART and the Port of Oakland together will need to provide \$1 million in local match. If the results of these studies are positive, BART will seek implementation funding for this Track Two project in cooperation with the Port of Oakland. Concurrently, BART is investigating alternative technologies and funding sources. Cost estimates and financial plans are being developed. This project is currently in Track Two.

Warm Springs

The Warm Springs extension was originally estimated to cost \$540.8 million. The funding programmed in Track One to this extension from currently authorized sources totals \$366 million, of which \$54 million is expended or under agreement. Other costs are in Track 2. Consideration is being given to the possibility of constructing this extension in phases. The cost and financial plan for this project will be updated when a new project scope and implementation schedule are completed.

Phase 2 and 3 System Extensions

The BART system expansion program has, for many years, included extensions of the BART rail system beyond the ends of the Phase 1 extensions program. These include extensions to the Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will actively pursue funding for the further planning and development of these projects. However, funding cannot reasonably be projected to become available for implementation within the timeframe of this ten-year program, so these projects are carried as Track Two projects.

Seismic Retrofit Program

At the time of its construction, BART was built to the most demanding seismic standards of the day. This level of design has served the region extremely well. During the time that the San Francisco-Oakland Bay Bridge and other regional freeway facilities were out of service for repairs following the major earthquake of October 1989, BART continued to operate smoothly and without incident.

Seismic design has developed considerably over the last 25 years. BART's extensions are being built to these new, more stringent standards. BART has proposed that the entire existing system be brought up to these new standards. This would be a major undertaking, with a current cost estimate of \$230 million. This program is not fundable under current projections of future allocations of traditional transit funding sources, therefore it is listed as a Track Two project. It is the District's position that a dedicated funding source should be identified for this proposed program, similar to the state program which is currently retrofitting the highway system for seismic strengthening. There is no other existing funding source capable of handling a program of this magnitude without seriously compromising transit operations in the region. BART intends to carefully review this matter with the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Metropolitan Transportation Commission (MTC).

Service Improvements

In the area of Service Improvements, the BART Track One capital program indicates the need to increase the capacity of the vehicle maintenance shops at the Concord and Hayward Yards in order to reduce the percentage of the fleet out-of-service awaiting maintenance at any given point in time. Currently, it is anticipated that the cost of these shop expansions will have to be borne by BART through the issuance of bonds.

BART and AC Transit have jointly developed a program of transit center (bus-to-BART) improvements which could be implemented at various BART stations, including Richmond, El Cerrito Plaza, West Oakland, Fruitvale, Coliseum/Oakland Airport, South Hayward, Union City and Fremont. Several of these proposed projects are programmed for Section 9 funding through AC Transit. No other funding is currently available for such projects, so they are listed as Track Two until such time as the programmed AC Transit funding is secured.

The proposed new BART administration building and the still-conceptual "Additional Capacity Enhancement Program" are also Track Two proposals at this time.

Research, Development & Demonstration

BART has embarked on an ambitious program of technology research, development and demonstration. *R,D&D funding is expected to continue to come from sources other than those typically available to transit, and will therefore not compete with, or otherwise compromise, the delivery of transit service in the region.*

The District has an existing grant to study the feasibility of using **superconducting magnetic energy storage (SMES)** as a means of supplementing traction power in locations where it is technically very difficult and/or too expensive to install additional conventional power supply, such as deep in the Transbay Tube. Two other means of addressing voltage sag on the BART system are being considered for further study: **cryogenic power converters** (to control voltage output of existing substations) and **high temperature superconducting materials**. If these approaches appear promising, BART will seek additional funding to further develop and ultimately implement appropriate technology.

Another area of technological promise under development is **Electric "Station Cars"**. BART is a member of state and national consortia working to demonstrate the use of electric vehicles as "station cars". The concept is to provide an all-electric, non-polluting transportation system linking public rail transit with the need for personalized trip-making at both the origin (home) and destination (work, shopping,

recreation, etc.) ends of the trip. The District has been awarded \$1.4 million in demonstration funding from defense conversion sources, the Bay Area Air Quality Management District, PG&E and Caltrans. Additional funding from these and other sources will be pursued as needs and opportunities arise.

Other areas in which BART is exploring the possibilities of leading edge technological developments and opportunities for R,D&D funding include: ***Active Noise Abatement, Artificial Intelligence, Advanced Traveler Information Systems, Security Enhancement, and Automated Test and Monitoring Equipment.***

Track One Projects -- Funding Needs

Project	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					2001	2002-06	
				1997	1998	1999	2000				
SYSTEM RENOVATION PROGRAM											
Rolling Stock											
A- and B-car renovation	454,400	282,376	172,024	4,468	9,000	20,677	50,863	61,114	26,102		
"Float cars" payments	21,500	0	21,500	10,900	10,600	0	0	0	0	0	0
Install automatic train control restoration units	700	0	700	700	0	0	0	0	0	0	0
Mainline											
Replace running rail & accessories	29,815	2,215	27,600	0	2,500	2,800	3,000	3,300	16,000		
Recoat steel tunnel liner rings	1,186	666	520	120	0	0	190	0	210		
Repaint structural girders & bridges for corrosion protection	1,812	1,192	620	620	0	0	0	0	0		
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200	0	0	0	1,200	0	1,200		
Replace pump pumps in subway tunnels	2,950	1,080	1,870	920	950	0	0	0	0		
Rehab traction power equipment	26,427	602	25,825	0	4,105	6,565	10,515	4,640	0		
Replace traction power house roofs	420	90	330	100	110	120	0	0	0		
Track embankment upgrade	243	0	243	0	0	0	0	0	0		
Replace R-O-W fencing and barbed wire	930	0	930	80	80	85	90	95	500		
Repair Lake Merritt Channel subway structure	1,860	0	1,860	0	360	1,500	0	0	0		
Replace surfaces at maintenance set-on points	765	0	765	0	180	190	195	200	0		
Asbestos abatement	5,500	0	5,500	1,500	2,500	1,500	0	0	0		
Stations											
Replace Auto. Fare Coll. equip. (see also ADA AFC below)	39,987	0	39,987	5,000	12,404	5,562	15,500	1,000	500		
Key Station (ADA) accessible AFC equipment	15,000	1,500	13,500	0	13,500	0	0	0	0		
Credit-debit vendors	2,780	2,380	400	400	0	0	0	0	0		
Renovate escalators and elevators systemwide	32,411	411	32,000	10,000	10,000	3,000	3,000	3,000	3,000		
"Mini Station" program	54,892	10,392	44,500	4,000	4,100	4,200	4,300	4,400	23,500		
Energy conservation lighting retrofit in stations	23,050	1,850	21,200	0	2,100	2,150	2,200	2,250	12,500		
Replace roofing on stations	2,942	802	2,140	0	200	220	230	240	1,250		
Add'l. faregates from storage at various stations	1,555	125	1,430	930	500	0	0	0	0		
Refurbish station agents' consoles systemwide	5,300	0	5,300	0	0	1,000	1,100	1,200	2,000		
Replace intel structures on W. Oakland platforms	1,900	0	1,900	0	0	370	1,530	0	0		
Replace P.A. systems at all stations	850	0	850	0	100	750	0	0	0		
Controls & Communications											
Next generation control system (Nxtgen)	19,226	14,030	5,196	5,196	0	0	0	0	0		
Advanced automatic train control (AATC)	71,600	31,500	40,100	0	40,100	0	0	0	0		
Rehab wayside train control equipment	31,443	0	31,443	1,883	8,525	5,825	6,492	8,718	0		
Electronic display destination sign replacement (platforms)	5,800	0	5,800	5,800	0	0	0	0	0		
DAS system modifications	3,000	0	3,000	3,000	0	0	0	0	0		
Conspic position in Central	265	195	70	70	0	0	0	0	0		
TRACS project additional funding	500	0	500	500	0	0	0	0	0		
Replace Digital Transmission System	4,000	0	4,000	0	1,500	1,500	1,000	0	0		
Replace yard cable plant	550	0	550	0	130	140	150	130	0		
Replace cable plant (excl. T1) systemwide	480	0	480	0	50	55	60	65	250		
Replace wayside cable plant splice boxes syswide	130	0	130	0	130	0	0	0	0		
Yard tower data network	670	0	670	0	670	0	670	0	0		
Replace yard voice recorders	260	0	260	0	260	0	0	0	0		

Track One Projects -- Funding Needs (continued)

Project	Total Cost	Funding to date	Funding Req'L	Fiscal Year Need					
				1997	1998	1999	2000	2001	2002-06
SYSTEM RENOVATION PROGRAM (continued)									
Shops & Yards									
Non-stock inventory (repairable parts provisioning)	27,000	0	27,000	2,000	2,200	2,400	2,600	2,800	15,000
Central receiving/distribution warehouse facility	6,403	0	6,403	403	6,000	0	0	0	0
Replace parts washing facilities in all shops	330	0	330	0	330	0	0	0	0
Employee facility improvements	2,213	0	2,213	213	2,000	0	0	0	0
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000	0	1,000	0	0	0	0
Replace roofing on shops, towers, etc.	3,600	0	3,600	0	400	500	0	700	2,000
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225	0	0	350	475	0	400
Paint and repair facility	2,000	0	2,000	200	1,800	0	0	0	0
Train operator training simulator	1,000	0	1,000	100	900	0	0	0	0
Terminal zone at R-60	100	0	100	100	0	0	0	0	0
Replace purchasing & inventory control system	570	0	570	0	570	0	0	0	0
Work Equipment									
Priority 2 subtotal (equip't, tools, PCs, service vehicles)	25,740	350	25,390	2,845	3,210	4,145	2,475	3,740	8,975
Subtotal - System Renovation Program	943,342	355,618	587,724	62,291	143,064	65,625	105,765	97,592	113,387
EXTENSIONS PROGRAM									
San Francisco Intl. Airport extension	1,167,000	106,000	1,061,000	1,061,000	0	0	0	0	0
Warm Springs extension (Track One portion) *	365,900	54,000	311,900	0	0	311,900	0	0	0
Subtotal - Extensions Program	1,532,900	160,000	1,372,900	1,061,000	0	311,900	0	0	0
* W. Sprgs. ext. also has \$174.9M Track Two portion									
SERVICE IMPROVEMENT PROGRAM									
Expansion of Concord & Hayward Shops	20,442	192	20,250	0	13,250	7,000	0	0	0
OTHER CAPITAL OBLIGATIONS									
	63,280	0	63,280	35,780	27,500	0	0	0	0
TOTAL TRACK ONE FUNDING NEEDS	2,569,964	515,810	2,044,154	1,159,071	183,814	384,525	105,765	97,592	113,387

Track One Program Proposed Funding Sources

DRAFT as of Aug. 15, 1996

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed				
				1997	1998	1999	2000	2001 2002-06
TOTAL FUNDING NEEDS	2,559,964	515,810	2,044,154	1,159,071	183,814	384,525	105,765	97,592 113,387
FUNDING SOURCES								
Rolling Stock Renovation Program								
Federal Sec. 3 for A- and B-car renovation (LONP)	239,473	239,473	0	0	0	0	0	0
Federal STP for A- and B-car renovation	30,000	15,000	15,000	0	5,000	0	5,000	0
State TCI and MTC bridge tolls for A- and B-car renovation	40,974	24,505	16,468	4,468	4,000	4,000	4,000	0
Renovation Program Other Than Rolling Stock								
Previous grants for system renovation	8,695	8,695	0	0	0	0	0	0
Section 9	52,327	N/A	52,327	19,833	4,464	4,332	1,511	3,372 18,715
Previous R&D funding for AATC	31,500	31,500	0	0	0	0	0	0
ARPA-FTA for AATC implementation (A-line)	16,000	0	16,000	0	16,000	0	0	0
Mitigation for Bay Br. retrofit for AATC Implem. (M-line)	21,600	0	21,600	0	21,600	0	0	0
Private sector financing for energy conservation retrofit	21,200	0	21,200	0	2,100	2,150	2,200	2,250 12,500
TCI in outyears	6,000	0	6,000	0	0	0	0	1,000 5,000
Pre-1995 reserves								
BART 1995 bond proceeds	14,998	3,398	11,600	11,600	0	0	0	0
Planned BART 1997 bond proceeds	117,475	33,239	84,236	25,770	58,466	0	0	0
Planned BART 1998 bond proceeds	80,300	0	80,300	36,400	34,084	9,816	0	0
Planned BART 1999 bond proceeds	63,000	0	63,000	0	38,100	24,900	0	0
Planned BART 2000 bond proceeds	129,000	0	129,000	0	0	0	92,954	36,046 0
Allocations from operating budget per SRTP	51,000	N/A	51,000	0	0	0	0	0 51,000
Funding for San Francisco Airport extension								
Funding for Warm Springs extension (Track One portion) *	1,187,000	106,000	1,061,000	1,061,000	0	0	0	0
* W. Sprgs. ext. also has \$174.9M Track Two portion	365,900	54,000	311,900	0	0	311,900	0	0
TOTAL FUNDS AVAILABLE	2,456,441	515,810	1,940,631	1,159,071	183,814	357,098	105,765	47,668 87,215
Annual shortfall	N/A	N/A	N/A	0	0	(27,427)	0	(49,924) (26,172)
Cumulative shortfall		0	(103,522)	0	0	(27,427)	(27,427)	(77,351) (103,522)

CHAPTER 3

FUNDING NEEDS--PROJECT PRIORITIES

11-A. Rolling Stock Renovation

All figures in thousands of dollars (three decimals places dropped).

I-B. Mainline Renovation									
	Total Cost	Funding to date	Funding Rec'd.	1997	1998	1999	2000	2001	2002-06
Priority 1									
Replace running rail & accessories	29,815	2,215	27,600		2,500	2,800	3,000	3,300	16,000
Rehabilitate subway ventilation fans	1,687	1,687	0						
Recoat steel tunnel liner rings	1,186	666	520	120			190		210
Repaint structural girders & bridges for corrosion protection	1,812	1,192	620	620					
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200						1,200
Replace sump pumps in subway tunnels	2,950	1,080	1,870	920	950				
Replace dry with wet standpipes	10,200	10,200	0						
Asbestos abatement (see also Pri. 2 below)	1,544	1,644	0						
Subtotal	53,818	22,008	31,810	1,660	3,450	2,800	3,190	3,300	17,410
Priority 2									
Rehab traction power equipment	26,427	602	25,825		4,105	6,565	10,515	4,640	
Replace traction power house roofs	420	90	330	100	110	120			
Track embankment upgrade	243	0	243	243					
Replace R-O-W fencing and barbed wire	930	0	930	80	80	85	90	95	500
Repair Lake Merritt Channel subway structure	1,960	0	1,860		360	1,500			
Replace surfaces at maintenance set-on points	765	0	765		180	190	195	200	
Asbestos abatement (see also Pri. 1 above)	5,500	0	5,500	1,500	2,500	1,500			
Subtotal	36,145	692	35,453	1,923	7,335	9,960	10,800	4,935	500

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I-B. Mainline Renovation (continued)													
	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					2001	2002-06			
				1997	1998	1999	2000						
Priority 3													
Repair structure damage in S.F. approach tunnel	1,000	0	1,000										
TBT vents automatic power transfer	2,565	0	2,565			1,000							
Replace TBT lower gallery lighting fixtures	180	0	180			2,335							
Additional blue light safety stations	155	0	155			180							
Remove gaps in handrail along emergency walkways	285	0	285			155							
Remove obstructions on emergency walkways	360	0	360			285							
TBT fan and damper control improvements	410	0	410			360							
Additional electrical insulation at various locations	160	0	160			410							
Motorize fire main valves in BHT	240	0	240			160							
Replace traction power control batteries	300	0	300			240							
Subtotal	5,655	0	5,655			50							
Priority 4						0							
Dry standpipes at I-680 and Springbrook crossings	370	0	370			50							
Tunnel hose valve plan	160	0	160			2,260							
Relocate crossover at C53	7,650	0	7,650			3,200							
Subtotal	8,180	0	8,180			3,200							
Category Total	103,798	22,700	81,098			3,583	13,045	16,490	21,700	8,300	17,980		

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-C. Stations Renovation

	Total Cost	Funding to date	Funding Req't	Fiscal Year Need				
				1997	1998	1999	2000	2001
Priority 1								
Replace Auto. Fare Coll. equip. (see also ADA AFC below)	39,987	0	39,987	5,000	12,404	5,582	15,500	1,000
Key Station (ADA) accessible AFC equipment	15,000	1,500	13,500	13,500				500
Credit-debit vendors	2,780	2,380	400	400				
Station security program	4,265	4,265	0					
Replace 19 station escalators	10,250	10,250	0					
Renovate escalators and elevators systemwide	32,411	411	32,000	10,000	10,000	3,000	3,000	3,000
Replace station signage	1,485	1,485	0					
Replace platform edge tile	1,587	1,587	0					
Repair stair tread edges and replace anti-slip treatments	551	551	0					
Key Station (ADA) signage improvements	952	952	0					
Key Station (ADA) 12th Street elevator replacement	900	900	0					
Key Station (ADA) accessible parking improvements	480	480	0					
Rehabilitate station elevator valves & sills	510	510	0					
Replace sewage pumps in underground stations	470	470	0					
Repair platform sub-surface at six stations	467	467	0					
Remove architectural barriers for accessibility	455	455	0					
Repair concrete roof of Lake Merritt Station	356	356	0					
Subtotal	112,906	27,019	85,887	15,400	35,904	8,582	18,500	4,000
Priority 2								
"Mint Station" program	54,892	10,392	44,500	4,000	4,100	4,200	4,300	4,400
Energy conservation lighting retrofit in stations	23,050	1,850	21,200	2,100	2,100	2,150	2,200	2,250
Modify change machines	925	925	0					
Replace roofing on stations	2,942	802	2,140	930	200	220	230	240
Adm'l. faregates from storage at various stations	1,555	125	1,430	500				
Replace and add bicycle lockers	596	596	0					
Replace bus transfer ticket machines	922	922	0					
Refurbish station agents' consoles systemwide	5,300	0	5,300			1,000	1,100	1,200
Replace lenterl structures on W. Oakland platforms	1,900	0	1,900			370	1,530	
Replace P.A. systems at all stations	850	0	850		100	750		
Subtotal	92,932	15,612	77,320	4,930	7,000	8,690	9,360	8,090
Priority 3								
Replace station parking lot signs	305	0	305		35	40	40	40
Resurface parking lots at stations as needed	2,910	0	2,910		540	265	275	280
Replace ceiling in No. Berkeley Station	1,070	0	1,070			1,070		
Subtotal	4,285	0	4,285	0	575	1,375	315	320
Category Total	210,123	42,631	167,492	20,330	43,479	18,647	28,175	12,410

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed. In order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis. All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-D. Controls & Communications Renovation

	Total Cost	Funding to date	Funding Req't	Fiscal Year Need			
				1997	1998	1999	2000 2001 2002-06
Priority 1							
Next generation control system *	19,226	14,030	5,196	5,196			
Replace radio network * ***	40,000	40,000	0				
Advanced automatic train control **	71,600	31,500	40,100		40,100		
Replace workstation consoles in Central *	1,240	1,240	0				
Replace Maint. Vehicle Detection Devices *	373	373	0				
Subtotal	132,439	87,143	45,296	5,196	40,100	0	0
Priority 2							
Rehab wayside train control equipment	31,443	0	31,443	1,853	8,525	5,825	8,718
Electronic display destination sign replacement (platforms)	5,800	0	5,800	5,800			
DAS system modifications	3,000	0	3,000	3,000			
Portable radios for station agents ***	120	120	0				
Portable radios for maintenance personnel ***	120	120	0				
Reverse running in Transbay Tube	130	130	0				
Comspac position in Central	265	195	70	70			
TRACS project additional funding	500	0	500	500			
Replace MARIS (MIS) software	1,615	1,615	0				
Replace Digital Transmission System	4,000	0	4,000		1,500	1,500	1,000
Replace yard cable plant	550	0	550		130	140	150
Replace cable plant (excl. T1) systemwide	480	0	480		50	55	60
Replace wayside cable plant splice boxes syswide	130	0	130		130		
Yard tower data network	670	0	670		670		
Replace yard voice recorders	260	0	260		260		
Subtotal	49,083	2,180	46,903	11,253	11,265	7,520	8,913
Priority 3							
Replace CATV and CCTV systemwide	310	0	310		70	75	80
Priority 4							
Replace T1 cable systemwide ***	8,000	8,000	0				
Category Total	189,832	97,323	92,509	16,449	51,435	7,595	7,782
							8,998
							250

* Does not include portions funded in extensions budgets.

** Preliminary estimate--actual cost to be determined based on funding strategy; if AATC is not implemented, then conventional resignaling needed on A-line.

*** These four projects are included as parts of the Joint Development Telecommunications Project.

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-E. Shops & Yards Renovation

	Total Cost	Funding to date	Funding Req'd	Fiscal Year Need				
				1997	1998	1999	2000	2001 - 2002-06
Priority 1								
Non-stock inventory (repairable parts provisioning)	27,000	0	27,000	2,000	2,200	2,400	2,600	2,800 15,000
Replace Hayward truing machine	1,500	1,500	0					
New wheel truing machine	2,116	2,116	0					
Hayward Shop traction motor repair facility reconfiguration	1,995	1,995	0					
Replace dust collector systems at Richmond & Concord	1,170	1,170	0					
Central receiving/distribution warehouse facility	6,403	6,403	6,403	403	6,000			
Replace parts washing facilities in all shops	330	0	330		330			
Subtotal	40,514	6,781	33,733	2,403	8,530	2,400	2,600	2,800 15,000
Priority 2								
Employee facility improvements	2,213	0	2,213	213	2,000			
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000		1,000			
Reconfigure transportation buildings	2,285	2,285	0					
Transfer track crossings	360	360	0					
Yard fuel tanks	23	23	0					
Metro bldg. fuel tank	155	155	0					
1000 volt power supplies	63	63	0					
Rich. Yard efficiency modifications	353	353	0					
Replace roofing on shops, towers, etc.	3,600	0	3,600		400	500		2,000
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225			350	475	700 2,000
Paint and repair facility	2,000	0	2,000	200	1,800			
Train operator training simulator	1,000	0	1,000	100	900			
Terminal zone at R-60	100	0	100	100				
Replace purchasing & inventory control system	570	0	570		570			
Subtotal	15,495	3,787	11,708	613	6,670	850	475	700 2,400
Priority 3								
Recondition shop sump pumps (Rich, Conc, Oak)	260	0	260		260			
Second wheel/axle press (location TBD)	1,550	0	1,550		1,550			
Rehabilitate and reconfigure Oakland Shop	75,160	0	75,160		160			75,000
Additional tracks at Hayward Yard	100	0	100		100			
Subtotal	77,070	0	77,070	0	2,070	0	0	0 75,000

Continued next page

J-E. Shops & Yards Renovation (continued)

	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001 2002-06
Priority 4								
Replace shop roll-up doors (Rich, Hay, Conc, Oak)	1,250	0	1,250			825	425	
Replace shop radiant heaters	200	0	200			200		
Resurface roads/parking and ramp shop/yard exterior lig	310	0	310			310		
Reconfigure/replace grease/oil facilities (Hay, Rich, Conc,	160	0	160			160		
Repaint shop floors	515	0	515			515		
Replace yard disconnect enclosures	620	0	620			130	240	250
Replace heating/cooling systems at East Bay shops	2,575	0	2,575			2,575		
Replace heating/cooling system at Lake Merritt Admin.	4,640	0	4,640		4,640			
Replace heating/cooling system at Cash Hdq. Bldg.	515	0	515		515			
Richmond shop, yard & tower security improvements	1,360	0	1,360		670	690		
Subtotal	12,145	0	12,145	0	5,825	5,405	665	250 0
Priority 5								
Corrosion protection isolation of East Bay yard traction po	3,200	0	3,200				3,200	
Storage area canopy, lighting and office at Richmond Sho	180	0	180		180			
Subtotal	3,380	0	3,380	0	180	0	3,200	0 0
Category Total	148,604	10,568	138,036	3,016	23,275	8,655	6,940	3,750 92,400

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-F. Work Equipment

Priority 2	Total Cost	Funding to date	Funding Rec'd	Fiscal Year Need					
				1997	1998	1999	2000	2001	2001-06
Replace M&E tools and test equipment	2,320	300	2,020		200	210	215	220	1,175
Replace RS&S tools and test equipment	1,205	0	1,205	50	75	100	110	120	750
Replace OAR tools and test equipment	325	0	325	10	15	20	25	30	225
Replace Transportation Dept. tools & equip't.	680	0	680	50	50	55	60	65	400
Replace Training Dept. tools & equipment	505	0	505	55	30	35	40	45	300
Office computers, LANs, WANs	1,700	0	1,700	350	150	150	150	150	750
Replace tolltest workstation	50	0	50	50					
Install Positron test rack	50	50	0						
Replace police cars	2,750	0	2,750	150	400	150	400	150	1,500
Replace vans	1,620	0	1,620	300	90	170	270	170	620
Replace pick-ups	2,820	0	2,820	250	330	430	280	280	1,250
Replace armored tractor-trailer truck	630	0	630	130					500
Rehab rail grinder & add vacuums	900	0	900	900					
Replace hi-rail yard switchers	550	0	550	550					
Replace electric maintenance carts and chargers	520	0	520						
Replace sedans	1,140	0	1,140	100	140	170	190	100	540
Replace forklifts	100	0	100	100					50
Replace hi-rail crew trucks	1,630	0	1,630	380	250	250	250	250	500
Replace hi-rail dump truck (track & structures)	240	0	240	240					
Replace hi-rail rereiling crane	450	0	450			450			
Replace hi-rail wrecker	250	0	250			250			
Replace hi-rail multi-crane	300	0	300	300					
Replace boom truck (stinger)	100	0	100	100					
Replace hi-rail speed swing	200	0	200			75	200		200
Replace backhoe/tractor	75	0	75						50
Replace hi-rail vacuum truck	200	0	200						80
Replace dump truck (grounds)	50	0	50			450			
Replace double bucket truck	80	0	80			50			
Replace hi-rail under-bridge truck	450	0	450						
Replace flat-bed truck	50	0	50						
Replace lube truck	110	0	110					110	
Replace hi-rail welding trucks	410	0	410	140			270		70
Replace trailer-mounted 635 KW generator	70	0	70				15		15
Replace portable pumps	30	0	30						
Retrofit locomotives	600	0	600	300		300			
Replace tamper liner	600	0	600			600			
Replace ballast regulator	180	0	180			180			
Recondition geometry car	1,800	0	1,800					1,800	
Subtotal	25,740	350	25,390	2,845	3,210	4,145	2,475	3,740	8,975

Continued next page

I-F. Work Equipment (continued)									
	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					
				1997	1998	1999	2000	2001	
Priority 3									2002-06
Replace automotive lifts at all shops	380	0	380		310	70			
Replace air compressors at all shops	430	0	430		350		80		
Replace lathes and mills at Hayward and Oakland	210	0	210		210				
Replace machine shop equip. (Conc, Hay, Rich, D)	50	0	50						50
Replace hi-rail fire trucks	700	0	700			350	350		
Portable 3MW traction power substation	1,600	0	1,600		1,600				
Replace forklift	60	0	60		60				
Replace trailer-mounted welder	40	0	40					20	20
Replace trailer-mounted compressor	70	0	70						70
Replace trailer-mounted 50 KW generator	40	0	40					40	
Replace portable 3 KW generators	15	0	15					15	
Replace heavy-duty trailer	60	0	60					60	
Replace light-duty trailer	30	0	30					30	
Subtotal	3,685	0	3,685	0	2,530	420	430	165	140
Priority 4									
Replace trailer-mounted chipper	25	0	25					25	
Replace bobcat small tractor	40	0	40						40
Replace steam cleaners (Hay, Conc, Rich, DC)	80	0	80		20	10	10		40
Subtotal	145	0	145	0	20	10	10	25	80
Priority 5									
Replace trash compactors	300	0	300	0	230	0	70	0	0
Category Total	29,870	350	29,520	2,845	5,990	4,575	2,985	3,930	9,195

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

II. Extensions		Funding								
		Total Cost	Funding to date	Req't.	1997	1998	1999	2000	2001	2002-06
Priority 1										
	to Dublin-Pleasanton (1)	543,050	543,050	0						
	West Dublin/Pleasanton station (2)	33,000	0	33,000		33,000				
	to Pittsburg-Bay Point (3)	505,740	505,740	0						
	Pittsburg-Bay Point to Railroad Ave. (4)	200,000	96,000	104,000						
	to Warm Springs--Track One (5)	365,900	54,000	311,900			311,900			104,000
	to Warm Springs--Track Two (5)	174,900	0	174,900			174,900			
	to San Francisco Airport (6)	1,167,000	106,000	1,061,000			143,475			
	Oakland Airport Connector (7)	149,600	1,125	148,475						
	Commuter rail system (8)	TBD	0	TBD						
	Subtotal	3,139,190	1,305,915	1,833,275	1,066,000	33,000	630,275	0	0	104,000
Priority 2										
	Phase 2 and 3 Extensions									
	to Antioch	TBD	3,295	TBD						
	through West Contra Costa									
	to Livermore									
	within San Francisco									
	through San Ramon Valley Corridor									
	to Santa Clara County									
	Subtotal	TBD	3,295	TBD						
1.3 "Total Cost" shown is programmed funding. Actual cost at completion to be determined.										
2 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.										
4.5 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.										
5 Funding currently programmed for the Warm Springs extension totals \$365.9M, of which \$54M is expended or under funding agreement.										
6 Estimated cost of proposed project in current Locally Preferred Alternative; proposed funding plan includes \$750M total from FTA (\$65M has been appropriated to date), \$99M total from the recently executed Amendment to the BART-SamTrans Agreement, \$108M total in state funds (\$20M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$1M received to date), and \$200M from the S.F. Airport itself.										
7 Cost in 1996 dollars, assuming Suspended Light Rail Transit (SLRT) technology. Will be updated when a funding plan and implementation schedule can be finalized. Project cost using alternate technologies would vary.										
8 BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State recently approved BART management of the Capital Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.										
Category Total		3,139,190	1,309,210	1,833,275	1,066,000	33,000	630,275	0	0	104,000

1.3 "Total Cost" shown is programmed funding. Actual cost at completion to be determined.

2 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

4.5 Assumes funding from other than Resolution 1876 sources.

4.5 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

5 Funding currently programmed for the Warm Springs extension totals \$385.9M, of which \$54M is expended or under funding agreement.

6 Estimated cost of proposed project in current Locally Preferred Alternative; proposed funding plan includes \$750M total from FTA (\$65M has been appropriated to date), \$99M total from the recently executed Amendment to the BART-SanTrans Agreement, \$108M total in state funds (\$20M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$1M received to date), and \$200M from the S.F. Airport itself.

7 Cost in 1996 dollars, assuming Suspended Light Rail Transit (SLRT) technology. Will be updated when a funding plan and implementation schedule can be finalized. Project cost using alternate technologies would vary.

8 BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State recently approved BART management of the Capital Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

III. Seismic Retrofit Program									
Priority 2	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					
				1997	1998	1999	2000	2001	2002-06
Seismic rack anchors & vehicle support tie-downs	400	0	400		400				
Seismic restraints on overhead cranes	200	0	200		200				
Engine-generators for earthquake standby power #1	4,500	0	4,500		2,400	2,100			
Engine-generators for earthquake standby power #2	2,160	0	2,160		210	1,950			
Support of Caltrans seismic work (reimbursable)	1,215	1,215	TBD						
Seismic structural evaluation of aerial structures	1,145	0	1,145		1,145				
Seismic retrofit of aerial structures	218,450	0	218,450			24,400	25,150	25,900	143,000
Seismic sensing system upgrade	2,500	0	2,500		2,500				
Gas valve automatic seismic shut-offs	170	0	170			170			
Retrofit Transbay Tube seismic joints	620	0	620		620				
Category Total	231,360	1,215	230,145	0	7,475	28,620	25,150	25,900	143,000

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

IV. Service Improvements

	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001 2002-06
Priority 2								
A-line traction power enhancements	21,200	0	21,200			2,200		19,000
M-line traction power enhancements	47,550	0	47,550			9,550		38,000
C-line traction power enhancements	6,500	0	6,500			6,500		
R-line traction power enhancements	22,500	0	22,500			16,000		6,500
Initial expansion of Hayward Shop	8,000		8,000		1,000	7,000		
Expand Concord Shop	12,442	192	12,250	0	12,250			
Subtotal	118,192	192	118,000	0	13,250	41,250	0	63,500
Priority 3								
Bicycle access Improvements	TBD	0	TBD					
Panfinder sign program	TBD	0	TBD					
Anti-graffiti program	580	580	0					
Hayward transit center	2,142	1,142	1,000		1,000			
BayFair transit center	1,007	1,007	0					
Concord transit center	2,318	2,318	0					
Walnut Creek transit center	2,930	2,930	0					
Daly City transit center	6,650	6,650	0					
Pittsburg park/ride	1,761	1,761	0					
Asbury Station parking redesign	255	0	255	255				
System Capacity Study	300	150	150	150				
PI Hill park/ride for I-680/24 mitigation	979	689	290		140	150		
El Cerrito Plaza access and station area improvements	5,500	5,500	0					
West Oakland access and station area improvements	TBD	0	TBD					
Fruitvale access and station area improvements	TBD	0	TBD					
Union City access and station area improvements	TBD	0	TBD					
Rockridge access and station area improvements	TBD	0	TBD					
El Cerrito Plaza transit center (AC Transit funding)	335	0	335	335				
Richmond transit center (AC Transit funding)	625	0	625	625				
Fremont transit center (AC Transit funding)	3,340	0	3,340		3,340			
Fruitvale transit center (AC Transit funding)	3,675	0	3,675		3,675			
South Hayward transit center (AC Transit funding)	1,280	0	1,280		1,280			
Coliseum transit center (AC Transit funding)	730	0	730			730		
Union City transit center (AC Transit funding)	3,060	0	3,060			3,060		
West Oakland transit center (AC Transit funding)	210	0	210				210	
New administrative headquarters building	60,238	238	60,000		30,000			
Additional Capacity Enhancement Program *	2,000,000	0	2,000,000					2,000,000
Subtotal	2,097,915	22,965	2,074,950	405	32,100	38,445	3,790	210 2,000,000
* Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities; in order to support an increase in daily patronage from 361,000 daily under the currently projected growth plan, to 500,000 daily under and "Additional Capacity Enhancement" program.								
Category Total	2,216,107	23,157	2,192,950	405	45,350	79,695	3,790	210 2,063,500

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

V. Research, Development and Demonstration									
Priority 2	Total Cost	Funding to date	Funding Req't	Fiscal Year Need					
				1997	1998	1999	2000	2001	2002-06
Electric Station Cars demonstration	1,440	1,440	0						
Electric vehicle charging kiosk demonstration	1,100	1,100	0						
Sound mitigation/noise reduction program	TBD	350	TBD						
Superconducting Magnetic Energy Storage	TBD	350	TBD						
Adaptive diagnostic systems	TBD	75	TBD						
Traction power optimization	TBD	0	TBD						
Other	TBD	0	TBD						
Category Total	TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD	TBD

NOTES

All figures in thousands of dollars (three decimal points dropped).

CHAPTER 4

FUNDING NEEDS--PROJECT DESCRIPTIONS

System Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful life of the various components of the physical plant.

Rolling Stock Renovation

A- and B- Car Renovation

The renovation of the District's original fleet of A and B Cars is essential to enable the District to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. The A and B Cars will be 25 years old prior to renovation and have never been overhauled. The renovation will replace worn out and obsolete components and return the vehicles to their original design specifications. Systems to be replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of new car cost.

Replace Electrical Couplers on C-1 Cars

The existing "pin-type" inter-car electrical couplers on BART cars are very high maintenance items. Conversion to "button-type" couplers will reduce maintenance requirements and car out-of-service time.

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically increase the speed with which recovery from such failures can be accomplished, thereby putting temporarily disabled on-line trains back in service much faster. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

Replace A&B Car Door Components

Malfunctions of the door systems on A- and B- cars is a major factor in service disruptions, and needs to be addressed earlier than can be accomplished through the whole car renovation program. One problem is expansion of the foam comprising the door core, which then delaminates the door structures and causes jams. Another problem is corroded door suspension rails are also contributing to door failures.

Mainline Renovation

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline which have deteriorated, or will in the next ten years, due to age and use. Many components of the trackway and traction power systems are approaching 25 years old, are failing with increased frequency and must be reconditioned or replaced. Mainline renovation will prevent rail and traction power failures which would cause disruption and delays to revenue service. The highest priority Mainline Renovation projects include:

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require changeout on a three to five year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency evacuation and for maintenance crews working in subway sections. In the past, failures of fans have been experienced due to cracks that developed in the blades, causing the blades to fail. An engineering analysis was made of all ventilation fans throughout the system and it was found that the blades require replacement.

Recoat Tunnel Liner Rings and Structural Girders for Corrosion Protection

The steel rings that line BART tunnels must be undergo heavy maintenance periodically, including removal of corrosion encrustation, sandblasting, and application of corrosion-resistant coating. The BART aerial structural girders and bridges have not undergone a complete rehabilitative repainting since their construction in the 1960's and early 1970's. This work is essential to avoid corrosion and consequent structural deterioration and weakness.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes which attract the forces of corrosion and are consumed in the process. These anodes must be replaced on a cycle of about every ten years.

Replace Sump Pumps in Subway Tunnels

The sump pumps which keep BART subway tunnels dry are nearly 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keep the system safe and reliable.

Replace Dry with Wet Standpipes

This ongoing project is replacing dry standpipes with "wet" (water-filled) standpipes for improved fire-fighting capability.

Asbestos Abatement

The 1989 Loma Prieta earthquake disrupted asbestos insulation in train control electronics rooms at various locations around the District. These rooms can now be entered by maintenance personnel only when fully suited up for potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive.

Traction Power Renovation

This is a long-term program to rehabilitate a wide range of traction power components and subsystems as these items continue to age and deteriorate, leading to lower reliability and higher potential for service disruption. Individual items will include reconditioning of rectifiers and replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, switch enclosures, and gas-pressure cable pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system have been identified as being in critical need of repair. The roofs are constructed of steel decking and in some cases, have rusted completely through. Water incursion into substations can result in traction power failures and serious service disruption.

Track Embankment Upgrade

This project will correct and upgrade a faulty, eroding track embankment situation between Union City and Fremont Stations.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or due to vandalism. This is a critical safety item.

Mainline Renovation also includes the following representative projects:

- Repair of damaged portions of subway tunnel under the Lake Merritt Channel.
- Repair of damage in San Francisco approach tunnel.
- Replace surfaces at right-of-way maintenance set-on points.

Stations Renovation

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. The highest priority Stations Renovation projects include:

Replace Automatic Fare Collection Equipment

The Automatic Fare Equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore difficult and costly to maintain, and should be replaced based on life-cycle analysis. Total system replacement is currently estimated to cost on the order of \$100 million, which may be more than will be available in the near-term. The project, as currently defined at a cost of \$40 million, will replace faregates, ticket vendors and addfares in those stations with the highest passenger traffic volumes, and recondition the old equipment for use elsewhere in the system. The project needs to be done in order to: decrease revenue collection and maintenance costs through use of more modern servicing modules; increase revenue security and accountability through use of sealed coin and bill units; implement an upgraded Data Acquisition System; and increase equipment availability for customers through greater reliability and maintainability. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as existing equipment approaches the end of its useful service life. To the extent that the regional multi-operator Translink "universal" ticket program is integrated with BART fare equipment, there is additional rationale for a reliable, modern AFC system.

Accessible AFC Equipment (ADA compliance)

This project will bring the BART Automatic Fare Equipment system into compliance with ADA requirements.

Credit-Debit Vendors

This project is providing new farecard vending equipment in a number of high volume stations to permit the sale of high value farecards with both credit and debit bank cards.

Station Security Program

This project is increasing the illumination levels of surface parking lots, adding emergency police callboxes in parking lots, improving police radio communications in multi-level parking structures, and providing decentralized headquarters structures to accommodate community-based deployment of BART police forces.

Replace and Rehabilitate Escalators and Elevators

Other than at Embarcadero Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads,

particularly in the various downtown subway stations. After more than 24 years of use and wear-and-tear, they are becoming unreliable, a major source of patron dissatisfaction, and uneconomical to maintain and repair on a routine basis. Several of the most unreliable will to be replaced, and all of the others will be completely reconditioned.

Replace Maps and Signs in Stations

This project will update and replace the current porcelain enameled maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project will provide a graphic display system that is more flexible and more easily updated than the current maps which have not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations and are delaminating from the platforms as well. They need to be replaced to remain safe, functional, and in compliance with ADA.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment must be renewed in order to protect the safety of those who use the stairs, especially during wet weather.

Key Station (ADA) Accessibility Improvements

These projects are providing federally-mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for the supply of accessible car and van parking. These projects are needed to comply with Americans With Disabilities Act (ADA) requirements and to improve passenger safety.

Renovate Station Elevator Components

This project is renovating stations elevators which have been in service for almost 25 years. The project is necessary to make the elevators more reliable and safe. Due to the age of the elevators, trouble calls are increasing and equipment is out of service for longer intervals, causing inconvenience to passengers, especially the elderly and mobility-impaired.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the

BART system opened almost 25 years ago. They are becoming increasingly unreliable and uneconomic to maintain. These pumps must be functional as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to begin to lift and create potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. It is necessary to reconstruct the sub-surfaces to allow a stronger bond for the tiles.

Repair Concrete Roof of Lake Merritt Station

This project will repair the structurally deteriorated concrete roof and replace waterproofing over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof has caused water leakage in the south stairway area making it necessary to close that stairway whenever it rains. The water intrusion will also corrode the reinforcing steel in the concrete roof causing further structural deterioration. Implementation of this repair work will restore the structural integrity of the concrete roof and provide safe and uninterrupted patron access between mezzanine and platform levels.

"Mint Stations" Program

This is a multi-year program to improve the passenger experience in the BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted, retiled as necessary. Weather-protection canopies and windbreaks are being renovated as needed. Repairs are being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Energy Conservation Lighting Retrofit in Stations

The 25 year old lighting systems in most BART stations consume far more electricity than equivalent modern systems. This project would replace those outdated systems with new equipment which would generate substantial energy conservation and consequently significant operating savings.

Modify Change Machines

The change-making machines throughout the BART system are being retrofitted to provide better reliability and improved cash collection efficiency.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards,

protect equipment and furnishings, and avoid structural damage, roofing must be replaced on a periodic basis.

Refurbish and Install In-Storage Faregate Units

The District has 30 faregate units in long-term storage, which are being refurbished and installed at various locations where exit faregate queuing problems occur.

Replace Bike Lockers

The bicycle storage lockers at stations have deteriorated to the point of not providing an acceptable level of security and weather protection, and are being replaced.

Replace Bus Transfer Ticker Machines

The machines in BART stations which issue transfer tickets are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus service. These machines are being replaced.

Refurbish Station Agent Consoles

The electronics in the station agent consoles are still the original installations. Most of these electronics are obsolete and no longer supported by manufacturers, making the maintenance of these increasingly unreliable units time-consuming and excessively expensive.

Replace Lentel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts (lentels) which are cracking and deteriorating due to vibration. This project would replace those lentels with a different type of structure less susceptible to vibration damage.

Replace/ Recondition Station Public Address Systems

This project would recondition or replace, as warranted, public address systems at those stations where the volume and/or voice quality of the existing installation has deteriorated to the point of not being able to provide an acceptable level of information to patrons.

Controls & Communications Renovation

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. The highest priority Controls & Communications Renovation projects include:

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems included in this budget are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project is needed to replace the 24-plus year old computers running the DAS and DSS systems and the 14-year old CCS computers.

Replace Radio Network

This project is furnishing and installing a systemwide multi-frequency, trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The current radio system has several significant shortcomings, both in terms of capacity and reliability, which have frequent negative operational impacts and occasionally affect safety. BART has already been assigned broadcast frequencies, which are increasingly difficult to obtain. This project is being implemented through an innovative joint development program with private sector financing.

Advanced Automatic Train Control

This project is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project would allow system throughput to increase from the current 17 trains per hour up to 30 trains per hour. The system will be one which can be installed over the existing control equipment with relative ease and no service disruptions. The project will help BART to meet the increased demands on the system as headway reductions become necessary in the future.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. In addition, the extensions budgets provide for an increase in the number of work stations overall. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Replace Maintenance Vehicle Detection Devices

This project is replacing the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These vehicle detection devices are required to allow Central Control to observe the location of on-track maintenance vehicles. This detection system serves as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The units presently being used have been in service over 24 years and failure rates are increasing. When a failure occurs, the high-rail maintenance vehicle must be removed from mainline track, per PUC requirements, resulting in non-productive time in maintenance work schedules requiring single tracking.

Wayside Train Control Renovation

This is a long-term program to replace vital wayside train control components and subsystems which are becoming unreliable due to age and difficult to maintain due to obsolescence. Most of these components are no longer being produced and are no longer supported by manufacturers. If this work is not completed in a timely manner, essential train control hardware failures will lead to extensive disruption of service. This program will also replace the Sequential Occupancy Release System, (SORS). SORS is a Public Utilities Commission required back-up safety system to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the vital train control system. The primary SORS computer is almost 25 years old, is obsolescent, and becoming difficult to maintain. This safety critical system must remain operational and reliable.

Electronic Display Destination Sign Replacement

The electronic dot-matrix signs which display the destination of trains arriving in stations, as well as other passenger information, are almost 25 years old, unreliable, and no longer supported by the manufacturer. This project will replace those sign units with modern, highly reliable equipment which also provide greater flexibility in the formatting of information displays.

Reverse Running In Transbay Tube

Existing train control electronics currently restrict reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification is providing the necessary signaling to allow up to three trains simultaneously in the Tube.

Second Communications Specialist Position In Central Control

As the extensions become operational and the number of trains on-line increases, it will become necessary to have a second position from which BART communications specialists can make essential announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MARIS

This project is replacing the District's 25 year old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Replace Yard Voice Recorders

Located in each train storage and dispatch yard are multi-channel voice recorders which record all communications regarding train movements. This information can be critical in determining exactly what occurred in the event of any sort of accident involving trains in the yards. The existing units are becoming unreliable and hard to maintain.

Shop & Yards Renovation

The purpose of this program of projects is to address the deterioration of the shops and yards due to more than two decades of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. These projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance; and by reducing vehicle out-of-service time and keeping as many vehicles in service as possible, thereby reducing train crowding; make the shops and yards safer places in which to work; provide cost savings to the District by reducing maintenance turn-around time and eliminating travel time to and from vendors; and improve the efficiency of the shops and yards by providing employees with dependable equipment needed to perform their duties effectively. The highest priority Shops & Yards Renovation projects include:

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all repairable parts in support of all transit vehicles, station and field equipment, and AFC equipment. Failure to provide for these requirements could lead to vehicles out-of-service and potential disruption to normal maintenance and service operations. This on-going need must be funded annually.

Replace Wheel Truing Machine

This project, nearing completion, is replacing a 23 year old wheel truing machine in the Hayward Shop. The new, more reliable and higher capacity truing machine will allow the District to go to a higher standard of preventive maintenance for wheel profiles and will result in increased productivity and lower load factors since fewer cars will be held out-of-service waiting for wheel re-profiling. A second machine was also recently installed at the Richmond Shop.

Hayward Shop Rehab/Equipment Replacement

This project will rehabilitate the shop and replace maintenance equipment to support BART's aging fleet. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars will be held out of service for repairs in the future.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants, and provides minimal renovation of shop heating and cooling systems.

Central Receiving and Distribution Warehouse Facility

The District will face increased need for inventory of materials as the new system extensions come on-line, as the size of the operating fleet increases, and as parts must

be stocked for A and B cars as configured both before and after renovation. A new central receiving and distribution warehouse facility will meet those needs.

Replace Parts Washing Facilities in All Shops

This project replaces parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities if found not to be in compliance.

Employee Facilities Improvements

The infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building have not changed materially since the BART system opened. This project will provide basic essential reconditioning and remodeling as needed to provide acceptable work environments.

Overhaul Transit Vehicle Washers

The facilities used to wash the exterior of transit vehicles are still the original installations. They are becoming increasingly inefficient, and do not comply with current standards for containment and treatment of chemical-laden waste water. This project will bring the washers back up to design specifications and provide acceptable control of waste.

Reconfigure and Renovate Transportation Buildings

These buildings at the train dispatch yards provide the essential administrative facilities for on-site train operations, as well as lunch/breakrooms, locker rooms, and other support facilities for on-duty train operators. The current configuration of these buildings is inadequate to serve the increased number of operators required to operate higher levels of service associated with the new system extensions. At the same time, the existing structures will be reconditioned and remodeled as necessary, as in the Employee Facilities Improvement project.

Yard Fuel Tanks

This project will install 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement which will eliminate the need to bring maintenance vehicles from these outlying yards all the way into the Oakland Yard, as is now the case, to refuel.

MetroCenter Building Fuel Tank

The 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is no longer in compliance with regulations for underground fuel storage. BART has been ordered by Alameda County to replace the tank.

Yard Efficiency Improvements

This project will reconfigure trackwork at the Richmond Shop to improve staging and routing of cars to the new wheel truing machine to be installed there.

Replace Roofing On Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as the deteriorate due to age and exposure.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lift units must be assured through periodic reconditioning.

Shops & Yards Renovation also includes these other representative projects:

- Add a second wheel/axle press.
- Replace shop sump pumps.
- Replace the shop roll-up doors.
- Improve security at the Richmond Yard complex.

Work Equipment

The purpose of this program is to replace worn and obsolete maintenance and service vehicles and maintenance equipment. This equipment includes such items as tools, power generator sets, light towers, grounds and buildings maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police and personnel sedans, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from use. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate. The highest priority Work Equipment Replacement project is the replacement of gasoline-powered maintenance equipment used in subways with electrically-powered equipment, as required by CalOSHA tunnel safety orders.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by rail but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Castro Valley and Dublin/Pleasanton

This project is a 13.8 mile double track extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project in the Dublin-Pleasanton area. This project has been under construction for several years, and is scheduled to open in 1997. There will ultimately be three stations along the extension: one in Castro Valley located at I-580 and Redwood Road; a second station at West Dublin-Pleasanton near Stoneridge; and the third one at East Dublin-Pleasanton near Hacienda Business Park. Funding for the West Dublin/Pleasanton Station has not yet been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8 mile double track extension, and will have two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements will be made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point is scheduled to open in the second half of 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

San Francisco Airport

The proposed San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at Hickey, Tanforan, and Millbrae. This extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient transportation link between BART and CalTrain and to the West Bay communities.

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in

Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District. This extension will move BART further toward Santa Clara County and be an important step in "ringing the Bay".

Other Extension Projects

Oakland Airport Connector

The Oakland Airport Connector Project will directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project, and anticipates possible future selection to proceed to a second phase, preliminary engineering and environmental documentation. Other technologies and funding sources are also being evaluated.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with the expected host communities, and will pursue funding for further planning and development of these projects, but funding constraints indicate that their implementation will not be likely within the ten year timeframe of this current capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors faster than the BART system itself can be extended, is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area. This program would utilize existing equipment (leased or purchased) and trackage rights in order to implement service within two years of funding approval. BART and other local, regional, and state agencies are together developing strategies, including phased implementation, to identify and secure funding sources.

Seismic Retrofit Program

The purpose of this program of projects is to bring the existing system up to the latest seismic standards to enhance the system's ability to safely endure severe earthquakes and quickly return to service by:

- ◆ Improving the structural strength of BART's aerial structures and Transbay Tube joints in order to withstand greater seismic forces.
- ◆ Improving the system of seismic detectors which slows or stops trains in the event of an earthquake.
- ◆ Installing automatic seismic gas shut-off valves.
- ◆ Providing engine-generators for the event of a possible PG&E power loss.
- ◆ Provide restraints for overhead crane structures at maintenance shops.
- ◆ Provide tie downs for the stands that transit vehicles are supported on during maintenance at the shops.

The structural strengthening components of this project will bring existing structures up to current seismic standards, and improve the ability of the system to withstand major earthquakes with little or no damage. Other components of this project will augment earthquake preparedness systems already in place to provide more coverage, more detailed and accurate information, and to permit faster response to protect the safety of the rail system, its patrons and employees.

Service Improvements Program

Reconfigure, Rehabilitate & Enlarge Hayward and Concord Shops

The increasing size of the operation fleet requires that the heavy maintenance facilities at these two shops be reconfigured, rehabilitated and expanded in order to increase their efficiency adequate to properly maintain the expanded fleet. These expansions are also essential to reducing the amount of time cars are held out of service for maintenance and repairs.

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate patronage growth to 361,000 daily trips. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate growth to 500,000 daily trips. The Additional Capacity Enhancement subprogram is conceptual and still under development, but it would include additional transit vehicles; additional traction power and train control renovation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities beyond the projects listed separately in this *Capital Improvement Program*. This cost indicated for this item provides a preliminary estimate of what these additional improvements might entail.

West Oakland Access and Station Area Improvements

This project would be constructed in the area near West Oakland Station that is being considered for use by other agencies for the Cypress Corridor freeway replacement and inter-city rail service. The scope, cost and schedule for the project is subject to the results of these various planning activities.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Hayward, BayFair, Concord, Walnut Creek, and Daly City Transit Centers

These projects will improve traffic circulation in the vicinity of these stations, and will improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities. These projects are funded with Section 9 and STP/CMAQ, and state funds, and are underway.

AC Transit-Funded Transit Centers

AC Transit has applied for funding from a variety of sources to construct transit centers, as described above, at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South

Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations. BART will implement these projects should they secure funding.

New Administration Building

This project would acquire a new administration building large enough to accommodate all of the District's administrative employees in a centralized location. It is often necessary for BART employees to conduct business with each other in person. Staff time could be used much more productively if employees did not have to travel among BART's various locations throughout Oakland in order to get things done. The acquisition of a new administrative building would improve efficiency and productivity.

Research, Development & Demonstration

Superconducting Magnetic Energy Storage (SMES)

Two related projects are intended to study the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains at closer headways to support projected future service levels. Two different approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations) and high temperature superconducting materials.

Electric Station Cars

The District is funded for a demonstration program to purchase 45 electric cars to be used by BART and PG&E employees for access to and egress from stations. The project will demonstrate that with "station cars", transit can provide an all electric door-to-door service that will attract new patronage.

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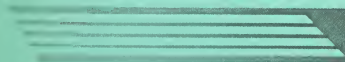
CAPITAL IMPROVEMENT PROGRAM

*July 1996 Through June 2006
Fiscal Years 1997 - 2006*

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Adopted September 26, 1996

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1997 - 2006

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration under the Federal Transit Laws, 49 U.S.C. Chapter 53 and passed through the Metropolitan Transportation Commission. This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

Adopted September 26, 1996

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

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CHAPTER 1

CONTEXT AND ORGANIZATION OF THE PROGRAM



Context of the Program

BART faces enormous challenges as it prepares to enter the 21st Century with this *Capital Improvement Program*. The District is preparing to start work on a billion dollar extension to the San Francisco International Airport, while at the same time undertaking an unprecedented program of rehabilitating and upgrading the existing system, and improving system accessibility -- all while maintaining and even improving the level of service provided.

An Aging System: The System Renovation Program

When BART initiated service in 1972, it was state-of-the-art: the most modern, most automated rail transit system in the world. Now, more than two decades later, BART is no longer the same sparkling new system. Recognizing this fact, in 1995 and 1996, BART began a major program of system renovation to ensure that service does not deteriorate in the future.

BART now carries twice as many passengers daily than in its early years, patronage is still growing, and the equipment is aging. This combination puts the BART system at risk if the District is not able to continue implementing its renovation program expeditiously. Most of the hardware that comprises the BART rail system will reach the end of its operational lifetime over the next few years unless it is rebuilt, reconditioned, or replaced. Renovation funding requirements are generated from a planned replacement cycle based on useful life. Examples of the aging of the BART system include:

- ◆ the typical BART railcar has accumulated over a million miles of travel;
- ◆ the doors on a typical car have cycled more than three million times;
- ◆ nearly a billion people have been transported in these vehicles, used the farecard vendors, activated the faregates, and ridden the escalators or walked the stairs;
- ◆ many of the electronic and computer systems which heralded a new era of rail transit technology a generation ago are now becoming obsolete, and therefore increasingly difficult and expensive to maintain.

This onset of aging makes it essential for BART to rebuild before it experiences the declining spiral of effects that many older rail transit systems have suffered due to their inability to attend to preventative maintenance and renovation in a timely manner. This

is not glamorous, high-visibility work, and it is very expensive. But it is essential, and in the long run ***it is much more cost effective to rehabilitate systems before reaching the point of failure than to try to fix problems after they become obvious.*** This will also avoid future degradation of service and consequent loss of patronage and fare revenue.

BART must not only maintain its current level of service while undergoing both expansion and rebuilding, but also provide even higher levels of service to meet the needs of a growing market. To provide reliability at higher levels of service, this *Capital Improvement Program* reflects the need for major renovation for stations; transit vehicles; train control, power, and communications systems; maintenance facilities; and many other parts of the BART physical plant.

A Growing System: Planned Growth and New Services

BART system patronage is expected to continue to grow in the future, both in terms of real growth on the existing core system and as a result of the opening of additional line segments and stations. Patronage is projected to grow 36.6 percent over the term of this ten year planning horizon, from 72.1 million trips in 1995/1996 to 100.6 million trips in 2005/2006. This will require additional facilities and capabilities. While BART invested heavily in increasing its people-carrying capacity over the last ten years, continued growth in patronage will require continued capacity expansion. In order to accommodate forecast growth, this capital program calls for improved facilities for feeder bus access; more reliable escalator, elevator and fare processing equipment; an advanced system of automatic train control to increase the frequency of train service; and additional maintenance facility capacity.

BART has completed a program of significant expansion of patron parking over the past few years. In the early 1990s, BART added more than 2,300 spaces at existing stations. Although demand for station parking continues to be a significant need, funding is not expected to be available for additional parking expansion in the foreseeable future. Over the next few years BART's station access improvement program will focus on grant-funded "intermodal" bus access projects. These projects, several of which are already underway, will increase the capacity to handle more feeder buses at the stations, along with providing more comfortable amenities for patrons who transfer to and from buses at BART stations. In addition, a highly innovative grant-funded demonstration program just getting underway involves a test of electric "station cars" as one more possible means of improving connections at both ends of BART rail trips.

Replacement of worn and unreliable escalators, elevators, and deteriorating farecard vending equipment and faregates, along with other station renovation projects

and implementation of better interoperator fare mechanisms, will improve the flow of patrons through the stations, while providing increased customer convenience.

The first phase of BART's extensions to the rail system is moving forward rapidly. The line extensions and new stations at Colma and North Concord/Martinez both opened in the winter of 1995/1996. The further extension from North Concord/Martinez to Pittsburg/Bay Point is planned to open in late 1996, and the new line to Castro Valley and Dublin/Pleasanton is forecast to open in 1997. Substantial progress is being made in the planning, design, and funding of the proposed extension from the new Colma Station to San Francisco International Airport. Initial construction of that billion dollar project is planned to begin in late 1996.

The District remains committed to the planned Phase 2 and 3 extensions of BART rail service to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. Anticipated funding limitations during the next ten years will almost certainly push their completion beyond that time frame. As a near-term interim solution, a network of commuter rail service using conventional diesel locomotives and standard passenger railcars could be placed in service in these same extension corridors at much lower costs and within two years of funding approval.

An Accessible System: Americans With Disabilities Act Compliance

The BART system has been hailed as a model of public transit accessibility for persons who are elderly and/or disabled, ever since the system began operation. To this day BART remains one of the most accessible rail systems in the world. But the federal Americans With Disabilities Act (ADA) has set even more comprehensive standards than those currently offered by BART or any other rail transit agency in the world. BART is moving aggressively to implement projects necessary to come into compliance with the new regulations.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Shop & Yards
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project has been assigned a priority level, independent from its funding availability status. These priorities are outlined in Chapter 3 (Funding Needs--Project Priorities). Priorities range from a high of 1 to a low of 5, based on law and regulation; or degree of criticality to safety, reliability of service, maintenance operations, operation of the extensions, and service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted, or essential to ensure operation performance of the extensions lines.
- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted, or introduction of

technological advancements which significantly improve operational performance or result in significant cost efficiencies.

- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed, District goals will not be achieved.
- 4 Routine replacement of worn or obsolescent equipment or systems, desirable system improvements, or reduced maintenance costs.
- 5 Identified need, but no near-term future cost or service impact.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the risk to operations, safety, or impact on operating costs.

Funding Availability Status

This ten-year *Capital Improvement Program (CIP)* lists all of the projects which the District would implement if adequate funding were available. The entire program totals \$6.8 billion and has a remaining funding need of \$5 billion (a summary of the entire capital program is displayed on page 11). A program of this size is currently beyond the level of funding which can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks", into which projects are assigned, based on the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects that are essential to continued safe and reliable operation of the system, and for which funding can be identified with a reasonable degree of probability. Track Two includes projects for which the projected future levels of existing funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future, and/or the creation of new funding sources. Page 12 presents a summary of overview of the two tracks. See Chapter 2 (Funding Strategy) for more information on funding availability for various programs.

Summary of Funding Needs by Program Area

BART FY1997-2006 Capital Improvement Program

Program Areas	Total Cost*	Funding to date	Funding Req't.*	Fiscal Year Need*				
				1997	1998	1999	2000	2001 2002-06
I. Systemwide Renovation								
A. Rolling Stock	485,148	290,924	194,224	16,068	19,600	20,677	50,663	61,114 26,102
B. Mainline	103,798	22,700	81,098	3,583	13,045	16,490	21,700	8,300 17,980
C. Stations	210,123	42,631	167,492	20,330	43,479	18,647	28,175	12,410 44,450
D. Controls & Communication	189,832	97,323	92,509	16,449	51,435	7,595	7,782	8,998 250
E. Shops & Yards	148,604	10,568	138,036	3,016	23,275	8,655	6,940	3,750 92,400
F. Work Equipment	29,870	350	29,520	2,845	5,990	4,575	2,985	3,930 9,195
Subtotal	1,167,375	464,496	702,879	62,291	156,824	76,640	118,245	98,502 190,377
II. Extensions								
A. Phase 1 Extensions	2,756,590	1,208,790	1,547,800	1,061,000	0	486,800	0	0 0
B. Oakland Airport Connector	149,600	1,125	148,475	5,000	0	143,475	0	0 0
C. W. Dublin/Pleasanton Station	33,000	0	33,000	0	33,000	0	0	0 0
D. Pittsburg-Bay Point to Railroad Ave.	200,000	96,000	104,000	0	0	0	0	0 104,000
E. Phase 2 & 3 Extensions	TBD	3,295	TBD	TBD	TBD	TBD	TBD	TBD TBD
F. Commuter Rail System	TBD	0	TBD	TBD	TBD	TBD	TBD	TBD TBD
Subtotal	3,139,190	1,309,210	1,833,275	1,066,000	33,000	630,275	0	0 104,000
III. Seismic Retrofit	231,360	1,215	230,145	0	7,475	28,620	25,150	25,900 143,000
IV. Service Improvements								
A. Current Planned Expansion	216,107	23,157	192,950	405	45,350	79,695	3,790	210 63,500
B. Additional Capacity Enhancement	2,000,000	0	2,000,000	0	0	0	0	0 2,000,000
Subtotal	2,216,107	23,157	2,192,950	405	45,350	79,695	3,790	210 2,063,500
V. Research, Development & Demonstr.	TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD TBD
VI. Other Capital Obligations	63,280	0	63,280	35,780	27,500	0	0	0 0
GRAND TOTALS	6,817,312	1,801,393	5,022,529	1,164,476	270,149	815,230	147,185	124,612 2,500,877

NOTES:

- * All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.
- * All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

Summary of Funding Needs by Funding Availability Status

BART FY1997-2006 Capital Improvement Program

Funding Status and BART Priority		Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
					1997	1998	1999	2000	2001 2002-06
Track One--Financially Constrained									
Priority 1									
Systemwide Renovation Program		824,825	433,875	390,950	40,727	107,584	34,460	74,953	71,214 62,012
Phase 1 Extensions Program		2,581,690	1,208,790	1,372,900	1,061,000	0	311,900	0	0
SUBTOTAL		3,406,515	1,642,665	1,763,850	1,101,727	107,584	346,360	74,953	71,214 62,012
Priority 2									
Systemwide Renovation Program		219,395	22,621	196,774	21,564	35,480	31,165	30,812	26,378 51,375
Service Improvement Program		20,442	192	20,250	TBD	13,250	7,000	0	0
Research, Development & Demonstration		TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD
SUBTOTAL		239,837	26,128	217,024	21,564	48,730	38,165	30,812	26,378 51,375
Other Capital Obligations		63,280	0	63,280	35,780	27,500	0	0	0
Track One Subtotal		3,709,632	1,668,793	2,044,154	1,159,071	183,814	384,525	105,765	97,592 113,387
Track Two--Unconstrained									
Priority 1									
Warm Springs unfunded Track Two portion		174,900	0	174,900	0	0	174,900	0	0
Oakland Airport Connector		149,600	1,125	148,475	5,000	0	143,475	0	0
Pittsburg-BayPoint to Pittsburg-Railroad, Ave.		200,000	96,000	104,000	0	0	0	0	104,000
W. Dublin-Pleasanton Station		33,000	0	33,000	0	33,000	0	0	0
Commuter Rail System		TBD	0	TBD	0	0	0	0	0
SUBTOTAL		557,500	97,125	460,375	5,000	33,000	318,375	0	104,000
Priority 2									
Phase 2 & 3 Extensions		TBD	3,295	TBD	TBD	TBD	TBD	TBD	TBD
Seismic Retrofit Program		231,360	1,215	230,145	0	7,475	28,620	25,150	25,900 143,000
Service Improvement Program		97,750	0	97,750	0	0	34,250	0	63,500
SUBTOTAL		329,110	4,510	327,895	0	7,475	62,870	25,150	25,900 206,500
Priority 3									
Systemwide Renovation Program		91,005	0	91,005	0	7,505	5,070	885	635 76,910
Service Improvement Program		97,915	22,965	74,950	405	32,100	36,445	3,790	210 0
Add'l Capacity Enhancement Program		2,000,000	0	2,000,000	0	0	0	0	2,000,000
SUBTOTAL		2,188,920	22,965	2,165,955	405	39,605	43,515	4,675	845 2,076,910
Priority 4									
Priority 5		28,470	8,000	20,470	0	5,845	5,945	8,325	275 80
Track Two Subtotal		3,107,680	132,600	2,978,375	5,405	86,335	430,705	41,420	27,020 2,387,490
GRAND TOTALS		6,817,312	1,801,393	5,022,529	1,164,476	270,149	815,230	147,185	124,612 2,500,877

CHAPTER 2

FUNDING STRATEGY



Funding Strategy Background

BART's capital improvement funding strategy is shaped by two important Metropolitan Transportation Commission (MTC) resolutions which provide foundations for both the system renovation and system extensions programs.

System Renovation and MTC Resolution 2672

Track One System Renovation

BART's full system renovation program totals just over a billion dollars over the next ten years. In May 1994, BART and the Metropolitan Transportation Commission (MTC) jointly adopted a cooperative funding program (MTC Resolution 2672) to address BART's most critical system renovation needs. This agreement calls for MTC to program \$450.8 million in federal, state, and bridge toll funds for BART renovation, and for BART to internally generate \$200.5 million as local match to the proposed grant funds. In fact, BART will have to generate substantially more than that amount in order to fund essential renovation projects beyond the scope of the BART-MTC agreement, and to provide interim funding prior to all of the external grant sources becoming available. The BART Track One System Renovation program includes all of the Priority 1 and Priority 2 projects listed in the System Renovation program areas, a detailed listing of which is shown on pages 25 through 33.

The funding plan originally set forth as part of Resolution 2672 anticipated MTC being able to program their entire \$450.8 million commitment over the period FY 1994 through FY 2000. Recent reductions in Congressional appropriations of transit system funding have led MTC to change their forecast of funds expected to be available to the region over the ten year period of this CIP. MTC's current funding projections for BART include an extension of the period for commitment of the agreed upon funds for BART system renovation. Programming of Section 3 funds for renovation of the A- and B-cars is extended from 2000 to 2004. Reductions in the federal Section 9 program have required MTC to identify other grant funds to replace Section 9 for non-car portions of the BART renovation program. Programming of these other grant funds for system renovation other than the car program is extended to 2006.

Track Two System Renovation

With the funding strategy outlined above, the essential components of the planned system renovation program can be included in Track One. Funding cannot yet be identified for the Track Two System Renovation program, which totals an additional \$115.2 million in projects identified as Priority 3, 4, or 5. These projects form part of the basis for continuing advocacy for increased transit funding levels.

System Extensions and MTC Resolution 1876

Track One Extensions

MTC Resolution 1876 provides the regional priorities and basic financial plan for new rail starts and system extensions throughout the greater Bay Area. For the BART system extensions program, full funding is programmed for completion of the Pittsburg-Bay Point and Dublin-Pleasanton extension projects. A Full Funding Grant Agreement for the extension to San Francisco International Airport is currently being negotiated, and is anticipated in the fall of 1996. All of these projects are therefore included in Track One. The Warm Springs extension is listed as a Track One project on the basis of Resolution 1876 regional priorities, but only partial funding has been programmed to date.

Track Two Extensions

The remaining funding requirements for Warm Springs, and for other planned extension projects, remains uncertain at this time and therefore are included in Track Two.

Funding Strategy by Program Area

System Renovation

A and B Car Renovation

Together with system extensions, renovation of the over 24-year-old BART system is at the heart of BART's capital program. The largest single component of system renovation is rebuilding the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort, which is included in Track One, is \$475.9 million, including a pro-rated share of the cost of "float" cars. Under the float car program, newly purchased C-2 cars will be used to maintain operating fleet size while A- and B-cars are taken out of service for renovation.

The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in federal Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in Bridge Toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$165.5 million.

In January of 1995 the BART Board of Directors approved a series of three fare increases to generate funds for system renovation, among other needs. A bond issue made in May 1995, and another planned for the spring of 1997, both of which are backed by the already approved fare increases, will provide the first increments of the \$165.5 million that BART must contribute for car renovation. Future bond issues, backed by future operating revenue, could provide the balance of BART's share.

Other System Renovation

Including other System Renovation program elements, the Track One BART system renovation program funding needs total approximately \$587.7 million. The current forecast of grant funding likely to be become available for non-vehicle system renovation includes \$52.3 million in federal Section 9 funds, \$25 million in STP/CMAQ, \$6 million in Section 3, \$15 million in bridge toll revenue, \$6 million in state TCI funds and \$32 million in other MTC programming. BART also anticipates receiving approximately \$37.6 million in non-traditional transit funding dedicated to the Advanced Automatic Train Control (AATC) project, which is part of the Track One program of renovation projects. See page 23, Funding Sources.

BART will need to supplement these anticipated grant funds. Since 1994/1995, the District has included future bond issues planned for 1998 and 1999, and their associated debt service, in the base financial case of the Short Range Transit Plan. These bond issues, backed by future operating revenues, can provide \$192 million above the revenue from the first two bond issues discussed above. In addition to these bond funds, BART intends to use an additional \$76 million allocated from future

operating budgets to supplement the planned bond programs and fund the remaining Track One renovation programs. Other lower priority renovation projects are included in Track Two.

Extensions Program

Castro Valley and Dublin/Pleasanton

This two-station extension is fully funded with all programmed project revenues currently executed in funding agreements with state and local agencies, therefore this project is included in Track One. BART will continue seeking funding unrelated to the MTC Resolution 1876 regional agreement, for completion of the third station at West Dublin-Pleasanton. Local jurisdictions in the Tri-Valley area are investigating the possibility of transportation impact development fees as one potential source of partial funding for this third station.

North Concord/Martinez and Pittsburg/Bay Point

This extension is considered fully funded for two stations, assuming all programmed funding is realized as currently planned, therefore this project is included in Track One. This programmed funding includes some project revenues available per the BART-SamTrans Agreement, which are contingent upon the San Francisco International Airport extension being approved for construction. Funding is also programmed in the Contra Costa Transportation Authority's Measure C Expenditure Plan which could provide partial funding through Measure C sales tax revenues for continuation of the extension to Railroad Avenue.

San Francisco International Airport

The proposed extension from the newly opened Colma Station to San Francisco International Airport, with intermediate stations, is currently estimated to cost \$1.167 billion for the Locally Preferred Alternative. This is a Track One project. The funding plan for the project is comprised of a total \$750 million in federal Section 3 "New Starts" funding, \$99 million total from the recently executed Amendment to the BART-SamTrans Agreement, \$108 million total state funds, \$10 million in MTC-allocated bridge tolls, as well as an additional \$200 million to be funded by the Airport itself.

Oakland Airport Connector

BART is competing for funding for development and implementation of the Oakland Airport Connector using Suspended Light Rail Transit (SLRT) technology under a special federal demonstration funding program for this type of project. If the FTA selects the District to continue with the project, the next step in the process is completion of an EIR/EIS and preliminary engineering, for which \$4 million in additional federal funds are currently being sought. If this funding is realized, BART and the Port of Oakland together will need to provide \$1 million in local match. If the results of these

studies are positive, BART will seek implementation funding for this Track Two project in cooperation with the Port of Oakland. Concurrently, BART is investigating alternative technologies and funding sources. Cost estimates and financial plans are being developed. This project is currently in Track Two.

Warm Springs

The Warm Springs extension was originally estimated to cost \$540.8 million. The funding programmed in Track One to this extension from currently authorized sources totals \$366 million, of which \$54 million is expended or under agreement. Other costs are in Track 2. Consideration is being given to the possibility of constructing this extension in phases. The cost and financial plan for this project will be updated when a new project scope and implementation schedule are completed.

Phase 2 and 3 System Extensions

The BART system expansion program has, for many years, included extensions of the BART rail system beyond the ends of the Phase 1 extensions program. These include extensions to the Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will actively pursue funding for the further planning and development of these projects. However, funding cannot reasonably be projected to become available for implementation within the timeframe of this ten-year program, so these projects are carried as Track Two projects.

Seismic Retrofit Program

At the time of its construction, BART was built to the most demanding seismic standards of the day. This level of design has served the region extremely well. During the time that the San Francisco-Oakland Bay Bridge and other regional freeway facilities were out of service for repairs following the major earthquake of October 1989, BART continued to operate smoothly and without incident.

Seismic design has developed considerably over the last 25 years. BART's extensions are being built to these new, more stringent standards. BART has proposed that the entire existing system be brought up to these new standards. This would be a major undertaking, with a current cost estimate of \$230 million. This program is not fundable under current projections of future allocations of traditional transit funding sources, therefore it is listed as a Track Two project. It is the District's position that a dedicated funding source should be identified for this proposed program, similar to the state program which is currently retrofitting the highway system for seismic strengthening. There is no other existing funding source capable of handling a program of this magnitude without seriously compromising transit operations in the region. BART intends to carefully review this matter with the California Department of Transportation (Caltrans), the California Transportation Commission (CTC), and the Metropolitan Transportation Commission (MTC).

Service Improvements

In the area of Service Improvements, the BART Track One capital program indicates the need to increase the capacity of the vehicle maintenance shops at the Concord and Hayward Yards in order to reduce the percentage of the fleet out-of-service awaiting maintenance at any given point in time. Currently, it is anticipated that the cost of these shop expansions will have to be borne by BART through the issuance of bonds.

BART and AC Transit have jointly developed a program of transit center (bus-to-BART) improvements which could be implemented at various BART stations, including Richmond, El Cerrito Plaza, West Oakland, Fruitvale, Coliseum/Oakland Airport, South Hayward, Union City and Fremont. Several of these proposed projects are programmed for Section 9 funding through AC Transit. No other funding is currently available for such projects, so they are listed as Track Two until such time as the programmed AC Transit funding is secured.

The proposed new BART administration building and the still-conceptual "Additional Capacity Enhancement Program" are also Track Two proposals at this time.

Research, Development & Demonstration

BART has embarked on an ambitious program of technology research, development and demonstration. *R,D&D funding is expected to continue to come from sources other than those typically available to transit, and will therefore not compete with, or otherwise compromise, the delivery of transit service in the region.*

The District has an existing grant to study the feasibility of using **superconducting magnetic energy storage (SMES)** as a means of supplementing traction power in locations where it is technically very difficult and/or too expensive to install additional conventional power supply, such as deep in the Transbay Tube. Two other means of addressing voltage sag on the BART system are being considered for further study: **cryogenic power converters** (to control voltage output of existing substations) and **high temperature superconducting materials**. If these approaches appear promising, BART will seek additional funding to further develop and ultimately implement appropriate technology.

Another area of technological promise under development is **Electric "Station Cars"**. BART is a member of state and national consortia working to demonstrate the use of electric vehicles as "station cars". The concept is to provide an all-electric, non-polluting transportation system linking public rail transit with the need for personalized trip-making at both the origin (home) and destination (work, shopping,

recreation, etc.) ends of the trip. The District has been awarded \$1.4 million in demonstration funding from defense conversion sources, the Bay Area Air Quality Management District, PG&E and Caltrans. Additional funding from these and other sources will be pursued as needs and opportunities arise.

Other areas in which BART is exploring the possibilities of leading edge technological developments and opportunities for R,D&D funding include: ***Active Noise Abatement, Artificial Intelligence, Advanced Traveler Information Systems, Security Enhancement, and Automated Test and Monitoring Equipment.***

Track One Projects -- Funding Needs

as of Sept. 16, 1996

Project	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					
				1997	1998	1999	2000	2001	2002-06
SYSTEM RENOVATION PROGRAM									
Rolling Stock	454,400	282,376	172,024	4,468	9,000	20,677	50,663	61,114	26,102
A- and B-car renovation	21,500	0	21,500	10,900	10,600	0	0	0	0
"Float cars" payments	700	0	700	700	0	0	0	0	0
Install automatic train control restoration units									
Mainline	29,815	2,215	27,600	0	2,500	2,800	3,000	3,300	16,000
Replace running rail & accessories	1,186	666	520	120	0	0	190	0	210
Recoat steel tunnel liner rings	1,812	1,192	620	620	0	0	0	0	0
Repaint structural girders & bridges for corrosion protection	4,524	3,324	1,200	0	0	0	0	0	1,200
Transbay Tube cathodic corrosion protection	2,950	1,080	1,870	920	950	0	0	0	0
Replace sump pumps in subway tunnels	26,427	602	25,825	0	4,105	6,565	10,515	4,640	0
Rehab traction power equipment	420	90	330	100	110	120	0	0	0
Replace traction power house roofs	243	0	243	243	0	0	0	0	0
Track embankment upgrade	930	0	930	80	80	85	90	95	500
Replace R-O-W fencing and barbed wire	1,860	0	1,860	0	360	1,500	0	0	0
Repair Lake Merritt Channel subway structure	765	0	765	0	180	190	195	200	0
Replace surfaces at maintenance set-on points	5,500	0	5,500	1,500	2,500	1,500	0	0	0
Asbestos abatement									
Stations	39,987	0	39,987	5,000	12,404	5,582	15,500	1,000	500
Replace Auto. Fare Coll. equip. (see also ADA AFC below)	15,000	1,500	13,500	0	13,500	0	0	0	0
Key Station (ADA) accessible AFC equipment	2,780	2,380	400	400	0	0	0	0	0
Credit-debit vendors	32,411	411	32,000	10,000	10,000	3,000	3,000	3,000	3,000
Renovate escalators and elevators systemwide	54,892	10,392	44,500	4,000	4,100	4,200	4,300	4,400	23,500
"Mint Station" program	23,050	1,850	21,200	0	2,100	2,150	2,200	2,250	12,500
Energy conservation lighting retrofit in stations	2,942	802	2,140	0	200	220	230	240	1,250
Replace roofing on stations	1,555	125	1,430	930	500	0	0	0	0
Add'l. faregates from storage at various stations	5,300	0	5,300	0	0	1,000	1,100	1,200	2,000
Refurbish station agents' consoles systemwide	1,900	0	1,900	0	0	370	1,530	0	0
Replace lens structures on W. Oakland platforms	850	0	850	0	100	750	0	0	0
Replace P.A. systems at all stations									
Controls & Communications	19,226	14,030	5,196	5,196	0	0	0	0	0
Next generation control system (Nxtgen)	71,600	31,500	40,100	0	40,100	0	0	0	0
Advanced automatic train control (AATC)	31,443	0	31,443	1,883	8,525	5,825	6,492	8,718	0
Rehab wayside train control equipment	5,800	0	5,800	5,800	0	0	0	0	0
Electronic display destination sign replacement (platforms)	3,000	0	3,000	3,000	0	0	0	0	0
DAS system modifications	265	195	70	70	0	0	0	0	0
Comspec position in Central	500	0	500	500	0	0	0	0	0
TRACS project additional funding	4,000	0	4,000	0	1,500	1,500	1,000	0	0
Replace Digital Transmission System	550	0	550	0	130	140	150	130	0
Replace yard cable plant	480	0	480	0	50	55	60	65	250
Replace cable plant (excl. T1) systemwide	130	0	130	0	130	0	0	0	0
Replace wayside cable plant splice boxes syswide	670	0	670	0	670	0	0	0	0
Yard tower data network	260	0	260	0	260	0	0	0	0
Replace yard voice recorders									

Track One Projects -- Funding Needs (continued)

as of Sept. 16, 1996

Project	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001 2002-06
SYSTEM RENOVATION PROGRAM (continued)								
Shops & Yards								
Non-stock inventory (repairable parts provisioning)	27,000	0	27,000	2,000	2,200	2,400	2,600	2,800 15,000
Central receiving/distribution warehouse facility	6,403	0	6,403	403	6,000	0	0	0 0
Replace parts washing facilities in all shops	330	0	330	0	330	0	0	0 0
Employee facility improvements	2,213	0	2,213	213	2,000	0	0	0 0
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000	0	1,000	0	0	0 0
Replace roofing on shops, towers, etc.	3,600	0	3,600	0	400	500	0	700 2,000
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225	0	0	350	475	0 400
Paint and repair facility	2,000	0	2,000	200	1,800	0	0	0 0
Train operator training simulator	1,000	0	1,000	100	900	0	0	0 0
Terminal zone at R-60	100	0	100	100	0	0	100	0 0
Replace purchasing & inventory control system	570	0	570	0	570	0	0	0 0
Work Equipment								
Priority 2 subtotal (equipmt, tools, PCs, service vehicles)	25,740	350	25,390	2,845	3,210	4,145	2,475	3,740 8,975
Subtotal -- System Renovation Program	943,342	355,618	587,724	62,291	143,064	65,625	105,765	97,592 113,387
EXTENSIONS PROGRAM								
San Francisco Int'l Airport extension	1,167,000	106,000	1,061,000	1,061,000	0	0	0	0 0
Warm Springs extension (Track One portion) *	365,900	54,000	311,900	0	0	311,900	0	0 0
Subtotal -- Extensions Program	1,532,900	160,000	1,372,900	1,061,000	0	311,900	0	0 0
* W. Sprgs. ext. also has \$174.9M Track Two portion								
SERVICE IMPROVEMENT PROGRAM								
Expansion of Concord & Hayward Shops	20,442	192	20,250	0	13,250	7,000	0	0 0
OTHER CAPITAL OBLIGATIONS	63,280	0	63,280	35,780	27,500	0	0	0 0
TOTAL TRACK ONE FUNDING NEEDS	2,559,964	515,810	2,044,154	1,159,071	183,814	384,525	105,765	97,592 113,387

Track One Program Proposed Funding Sources

as of Sept. 16, 1996

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed					2002-06
				1997	1998	1999	2000	2001	
TOTAL FUNDING NEEDS	2,559,964	515,810	2,044,154	1,159,071	183,814	384,525	105,765	97,592	113,387
FUNDING SOURCES									
Rolling Stock Renovation Program	239,473	239,473	0	0	0	0	0	0	0
Federal Sec. 3 for A- and B-car renovation (LONP)	30,000	15,000	15,000	0	5,000	0	5,000	5,000	0
Federal STP for A- and B-car renovation	40,974	24,505	16,468	4,468	4,000	4,000	4,000	0	0
State Prop. 109, TCI and MTC bridge tolls for car renovation									
Renovation Program Other Than Rolling Stock	8,695	8,695	0	0	0	0	0	0	0
Previous grants for system renovation	52,349	N/A	52,349	19,833	4,464	4,332	1,611	3,372	18,737
Section 9 for other than car renovation	25,000	0	25,000	0	0	0	0	0	25,000
Federal STP/CMAQ for other than car renovation	6,000	0	6,000	0	0	0	0	0	6,000
Federal Section 3 for other than car renovation	15,000	0	15,000	0	0	0	0	0	15,000
MTC net bridge toll revenues for other than car renovation	6,500	0	6,500	0	0	0	0	1,500	5,000
State TCI for other than car renovation	32,000	0	32,000	0	0	0	0	0	32,000
Post-TIP programming for other than car renovation	31,500	31,500	0	0	0	0	0	0	0
Previous R&D funding for AATC	16,000	0	16,000	0	16,000	0	0	0	0
ARPA-FTA for AATC implementation (A-line)	21,600	0	21,600	0	21,600	0	0	0	0
Mitigation for Bay Br. retrofit for AATC implem. (M-line)	21,200	0	21,200	0	2,100	2,150	2,200	2,250	12,500
Private sector financing for energy conservation retrofit									
Pre-1995 reserves	14,998	3,398	11,600	11,500	0	0	0	0	0
BART 1995 bond proceeds	117,475	33,239	84,236	25,770	58,466	0	0	0	0
Planned BART 1997 bond proceeds	80,300	0	80,300	36,400	26,684	17,216	0	0	0
Planned BART 1998 bond proceeds	63,000	0	63,000	0	38,100	24,900	0	0	0
Planned BART 1999 bond proceeds	129,000	0	129,000	0	0	13,427	92,954	22,619	0
Allocations from operating budget per SRTCP	76,000	N/A	76,000	0	7,400	6,600	0	1,300	60,700
Funding for San Francisco Airport extension	1,167,000	106,000	1,061,000	1,061,000	0	0	0	0	0
Funding for Warm Springs extension (Track One portion) *	365,900	54,000	311,900	0	0	311,900	0	0	0
* W. Sprgs. ext. also has \$174.9M Track Two portion									
TOTAL FUNDS AVAILABLE	2,559,963	515,810	2,044,153	1,159,071	183,814	384,525	105,765	36,041	174,937
Annual shortfall	N/A	N/A	N/A	0	0	0	0	(61,551)	61,550
Cumulative shortfall	0	0	0	0	0	0	0	(61,551)	0

CHAPTER 3

FUNDING NEEDS / PROJECT PRIORITIES



I. SYSTEM RENOVATION PROGRAM

I-A. Rolling Stock Renovation		Funding Req't	Fiscal Year Need				2002-06
Priority 1	Total Cost		1997	1998	1999	2000	
A- and B-car renovation Renovation program *	454,400	172,024	4,468	9,000	20,677	50,663	61,114
Float vehicles **	21,500	21,500	10,900	10,600	0	0	0
Subtotal	475,900	193,524	15,368	19,600	20,677	50,663	61,114
Other rolling stock renovation projects							
Replace electrical couplers on C-1 cars	2,200	0	0	0	0	0	0
Install automatic train control restoration units	700	700	700	0	0	0	0
Replace batteries on A, B and C-1 cars	1,660	0	0	0	0	0	0
Replace A- and B-car door components	4,688	0	0	0	0	0	0
Subtotal	9,248	700	700	0	0	0	0
* "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$15,000,000 in CMAQ, \$1,973,500 in TCI, \$15,000,000 in Prop. 108 bonds, \$7,531,800 in bridge tolls, and \$3,398,300 in BART funds. "Fiscal Year Need" refers to funds expenditure plan in the case of A- and B-Car Renovation only. All other projects show year of need for commitment of funds to contracts.							
** New C-2 vehicles to be used initially as replacements for cars out of service for renovation. After completion of the A/B Car Renovation Program, these vehicles will be additions to the overall fleet to accommodate patronage growth.							
Category Total	485,148	194,224	16,068	19,600	20,677	50,663	61,114

All figures in thousands of dollars (three decimals places dropped).

I-B. Mainline Renovation		Total Cost	Funding to date	Funding Req'd	1997	1998	1999	2000	2001	2002-06
Priority 1		29,815	2,215	27,600		2,500	2,800	3,000	3,300	16,000
	Replace running rail & accessories	1,687	1,687	0						
	Rehabilitate subway ventilation fans	1,186	666	520	120			190		210
	Recoat steel tunnel liner rings	1,812	1,192	620	620					
	Repaint structural girders & bridges for corrosion protection	4,524	3,324	1,200						1,200
	Transbay Tube cathodic corrosion protection	2,950	1,080	1,870	920	950				
	Replace sump pumps in subway tunnels	10,200	10,200	0						
	Replace dry with wet standpipes	1,644	1,644	0						
	Asbestos abatement (see also Pri. 2 below)	53,818	22,008	31,810	1,660	3,450	2,800	3,190	3,300	17,410
Subtotal										
Priority 2		26,427	602	25,825		4,105	6,565	10,515	4,640	
	Rehab traction power equipment	420	90	330	100	110	120			
	Replace traction power house roofs	243	0	243	243					
	Track embankment upgrade	930	0	930	80	80	85	90	95	500
	Replace R-O-W fencing and barbed wire	1,860	0	1,860		360	1,500			
	Repair Lake Merritt Channel subway structure	765	0	765		180	190	195	200	
	Replace surfaces at maintenance set-on points	5,500	0	5,500	1,500	2,500	1,500			
	Asbestos abatement (see also Pri. 1 above)	36,145	692	35,453	1,923	7,335	9,960	10,800	4,935	500
	Subtotal									

Continued next page

I-B. Mainline Renovation (continued)									
	Total Cost	Funding to date	Funding Req't.	1997	1998	1999	2000	2001	2002-06
Priority 3									
Repair structure damage in S.F. approach tunnel	1,000	0	1,000		1,000				
TBT vents automatic power transfer	2,565	0	2,565		230	2,335			
Replace TBT lower gallery lighting fixtures	180	0	180		180				
Additional blue light safety stations	155	0	155		155				
Remove gaps in handrail along emergency walkways	285	0	285		285				
Remove obstructions on emergency walkways	360	0	360		360				
TBT fan and damper control improvements	410	0	410			410			
Additional electrical insulation at various locations	160	0	160			160			
Motorize fire main valves in BHT	240	0	240			240			
Replace traction power control batteries	300	0	300		50	55	60	65	70
Subtotal	5,655	0	5,655	0	2,260	3,200	60	65	70
Priority 4									
Dry standpipes at I-680 and Springbrook crossings	370	0	370			370			
Tunnel hose valve plan	160	0	160			160			
Relocate crossover at C53	7,650	0	7,650				7,650		
Subtotal	8,180	0	8,180	0	0	530	7,650	0	0
Category Total	103,798	22,700	81,098	3,583	13,045	16,490	21,700	8,300	17,980

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-C. Stations Renovation

Priority	Total Cost	Funding to date	Funding Req'd	Fiscal Year Need				
				1997	1998	1999	2000	2001-2002-06
Replace Auto. Fare Coll. equip. (see also ADA AFC below)	39,987	0	39,987	5,000	12,404	5,582	15,500	500
Key Station (ADA) accessible AFC equipment	15,000	1,500	13,500		13,500			
Credit-debit vendors	2,780	2,380	400	400				
Station security program	4,265	4,265	0					
Replace 19 station escalators	10,250	10,250	0	10,000	10,000	3,000	3,000	3,000
Renovate escalators and elevators systemwide	32,411	411	32,000					
Replace station signage	1,485	1,485	0					
Replace platform edge tile	1,587	1,587	0					
Repair stair tread edges and replace anti-slip treatments	551	551	0					
Key Station (ADA) signage improvements	952	952	0					
Key Station (ADA) 12th Street elevator replacement	900	900	0					
Key Station (ADA) accessible parking improvements	480	480	0					
Rehabilitate station elevator valves & sills	510	510	0					
Replace sewage pumps in underground stations	470	470	0					
Repair platform sub-surface at six stations	467	467	0					
Remove architectural barriers for accessibility	455	455	0					
Repair concrete roof of Lake Merritt Station	356	356	0					
Subtotal	112,906	27,079	85,887	15,400	35,904	8,582	18,500	3,500
Priority 2								
"Mint Station" program	54,892	10,392	44,500	4,000	4,100	4,200	4,300	23,500
Energy conservation lighting retrofit in stations	23,050	1,850	21,200		2,100	2,150	2,200	12,500
Modify change machines	925	925	0					
Replace roofing on stations	2,942	802	2,140	200	200	220	230	1,250
Add'l. faregates from storage at various stations	1,555	125	1,430	930	500			
Replace and add bicycle lockers	596	596	0					
Replace bus transfer ticket machines	922	922	0					
Refurbish station agents' consoles systemwide	5,300	0	5,300			1,000	1,100	2,000
Replace lenter structures on W. Oakland platforms	1,900	0	1,900			370	1,530	
Replace P.A. systems at all stations	850	0	850	100	100	750		
Subtotal	92,932	15,612	77,320	4,930	7,000	8,690	9,360	39,250
Priority 3								
Replace station parking lot signs	305	0	305		35	40	40	150
Resurface parking lots at stations as needed	2,910	0	2,910		540	265	275	1,550
Replace ceiling in No. Berkeley Station	1,070	0	1,070			1,070		
Subtotal	4,285	0	4,285	0	575	1,375	315	1,700
Category Total	210,123	42,631	167,492	20,330	43,479	18,647	28,175	44,450

NOTES

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All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-D. Controls & Communications Renovation

	Total Cost	Funding to date	Funding Req't.	1997	1998	1999	2000	2001	2002-06
Priority 1									
Next generation control system *	19,226	14,030	5,196	5,196					
Replace radio network * ***	40,000	40,000	0						
Advanced automatic train control **	71,600	31,500	40,100		40,100				
Replace workstation consoles in Central *	1,240	1,240	0						
Replace Maint. Vehicle Detection Devices *	373	373	0						
Subtotal	132,439	87,143	45,296	5,196	40,100	0	0	0	0
Priority 2									
Rehab wayside train control equipment	31,443	0	31,443						
Electronic display destination sign replacement (platforms)	5,800	0	5,800	1,883	8,525	5,825	6,492	8,718	
DAS system modifications	3,000	0	3,000	5,800					
Portable radios for station agents ***	120	120	0	3,000					
Portable radios for maintenance personnel ***	120	120	0						
Reverse running in Transbay Tube	130	130	0						
Comspec position in Central	265	195	70	70					
TRACS project additional funding	500	0	500	500					
Replace MARIS (MIS) software	1,615	1,615	0						
Replace Digital Transmission System	4,000	0	4,000						
Replace yard cable plant	550	0	550	1,500	1,500	1,500	1,000		
Replace cable plant (excl. T1) systemwide	480	0	480	130	130	140	150	130	
Replace wayside cable plant splice boxes syswide	130	0	130	50	50	55	60	65	250
Yard tower data network	670	0	670	130	130				
Replace yard voice recorders	260	0	260	260					
Subtotal	49,083	2,180	46,903	11,253	11,265	7,520	7,702	8,913	250
Priority 3									
Replace CATV and CCTV systemwide	310	0	310		70	75	80	85	
Priority 4									
Replace T1 cable systemwide ***	8,000	8,000	0						
Category Total	189,832	97,323	92,509	16,449	51,435	7,595	7,782	8,998	250

* Does not include portions funded in extensions budgets.

** Preliminary estimate--actual cost to be determined based on funding strategy: if AATC is not implemented, then conventional resignaling needed on A-line.

*** These four projects are included as parts of the Joint Development Telecommunications Project.

NOTES

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I.E. Shops & Yards Renovation

	Total Cost	Funding to date	Funding Req't.	1997	1998	1999	2000	2001	2002-06
Priority 1									
Non-stock inventory (repairable parts provisioning)	27,000	0	27,000	2,000	2,200	2,400	2,600	2,800	15,000
Replace Hayward truing machine	1,500	1,500	0						
New wheel truing machine	2,116	2,116	0						
Hayward Shop traction motor repair facility reconfiguration	1,995	1,995	0						
Replace dust collector systems at Richmond & Concord	1,170	1,170	0						
Central receiving/distribution warehouse facility	6,403	0	6,403	403	6,000				
Replace parts washing facilities in all shops	330	0	330		330				
Subtotal	40,514	6,781	33,733	2,403	8,530	2,400	2,600	2,800	15,000
Priority 2									
Employee facility improvements	2,213	0	2,213	213	2,000				
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000		1,000				
Reconfigure transportation buildings	2,295	2,295	0						
Transfer track crossings	360	360	0						
Yard fuel tanks	23	23	0						
Metro bldg. fuel tank	155	155	0						
1000 volt power supplies	63	63	0						
Rich. Yard efficiency modifications	353	353	0						
Replace roofing on shops, towers, etc.	3,600	0	3,600		400	500	475	700	2,000
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225			350			400
Paint and repair facility	2,000	0	2,000	200	1,800				
Train operator training simulator	1,000	0	1,000	100	900				
Terminal zone at R-60	100	0	100	100					
Replace purchasing & inventory control system	570	0	570		570				
Subtotal	15,495	3,787	11,708	613	6,670	850	475	700	2,400
Priority 3									
Recondition shop sump pumps (Rich, Conc, Oak)	260	0	260		260				
Second wheel/axle press (location TBD)	1,550	0	1,550		1,550				
Rehabilitate and reconfigure Oakland Shop	75,160	0	75,160		160				75,000
Additional tracks at Hayward Yard	100	0	100		100				
Subtotal	77,070	0	77,070	0	2,070	0	0	0	75,000

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I-E. Shops & Yards Renovation (continued)

	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need			
				1997	1998	1999	2000
Priority 4							
Replace shop roll-up doors (Rich, Hay, Conc, Oak)	1,250	0	1,250			825	425
Replace shop radiant heaters	200	0	200			200	
Resurface roads/parking and relamp shop/yard exterior lig	310	0	310			310	
Reconfigure/replace grease/oil facilities (Hay, Rich, Conc,	160	0	160			160	
Repaint shop floors	515	0	515			515	
Replace yard disconnect enclosures	620	0	620			130	240
Replace heating/cooling systems at East Bay shops	2,575	0	2,575			2,575	
Replace heating/cooling system at Lake Merritt Admin.	4,640	0	4,640		4,640		
Replace heating/cooling system at Cash Hldg. Bldg.	515	0	515		515		
Richmond shop, yard & tower security improvements	1,360	0	1,360		670	690	
Subtotal	12,145	0	12,145	0	5,825	5,405	665
Priority 5							
Corrosion protection isolation of East Bay yard traction po	3,200	0	3,200				3,200
Storage area canopy, lighting and office at Richmond Sho	180	0	180		180		
Subtotal	3,380	0	3,380	0	180	0	3,200
Category Total	148,504	10,568	138,036	3,016	23,275	8,655	6,940
							3,750
							92,400

NOTES

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All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

I-F. Work Equipment

Priority 2

	Total Cost	Funding to date	Funding Req't.	1997	1998	1999	2000	2001	2001-06
Replace M&E tools and test equipment	2,320	300	2,020		200	210	215	220	1,175
Replace RS&S tools and test equipment	1,205	0	1,205	50	75	100	110	120	750
Replace OAR tools and test equipment	325	0	325	10	15	20	25	30	225
Replace Transportation Dept. tools & equip't.	680	0	680	50	50	55	60	65	400
Replace Training Dept. tools & equipment	505	0	505	55	30	35	40	45	300
Office computers, LANs, WANs	1,700	0	1,700	350	150	150	150	150	750
Replace tolltest workstation	50	0	50	50					
Install Positron test rack	50	50	0						
Replace police cars	2,750	0	2,750	150	400	150	400	150	1,500
Replace vans	1,620	0	1,620	300	90	170	270	170	620
Replace pick-ups	2,820	0	2,820	250	330	430	280	280	1,250
Replace armored tractor-trailer truck	630	0	630	130					500
Rehab rail grinder & add vacuums	900	0	900	900					
Replace hi-rail yard switchers	550	0	550	550					
Replace electric maintenance carts and chargers	520	0	520		270			250	
Replace sedans	1,140	0	1,140		140	170	190	100	540
Replace forklifts	100	0	100			50		50	500
Replace hi-rail crew trucks	1,630	0	1,630						
Replace hi-rail dump truck (track & structures)	240	0	240		380	250	250	250	
Replace hi-rail rerailling crane	450	0	450		240				
Replace hi-rail wrecker	250	0	250			450			
Replace hi-rail multi-crane	300	0	300		300	250			
Replace boom truck (slinger)	100	0	100		100				
Replace hi-rail speed swing	200	0	200				200		
Replace backhoe/tractor	75	0	75			75			
Replace hi-rail vacuum truck	200	0	200						200
Replace dump truck (grounds)	50	0	50						50
Replace double bucket truck	80	0	80						80
Replace hi-rail under-bridge truck	450	0	450			450			
Replace flat-bed truck	50	0	50			50			
Replace lube truck	110	0	110		140			110	
Replace hi-rail welding trucks	410	0	410				270		70
Replace trailer-mounted 635 KW generator	70	0	70						15
Replace portable pumps	30	0	30				15		
Retrofit locomotives	600	0	600		300	300			
Replace tamper liner	600	0	600			600			
Replace ballast regulator	180	0	180			180			
Recondition geometry car	1,800	0	1,800					1,800	
Subtotal	25,740	350	25,390	2,845	3,210	4,145	2,475	3,740	8,975

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I-F. Work Equipment (continued)

	Total Cost	Funding to date	Funding Req'd.	Fiscal Year Need				
				1997	1998	1999	2000	2001 2002-06
Priority 3								
Replace automotive lifts at all shops	380	0	380		310	70		
Replace air compressors at all shops	430	0	430		350		80	
Replace lathes and mills at Hayward and Oakland	210	0	210		210			
Replace machine shop equip. (Conc, Hay, Rich, D	50	0	50					50
Replace hi-rail fire trucks	700	0	700			350	350	
Portable 3MW traction power substation	1,600	0	1,600		1,600			
Replace forklift	60	0	60		60			
Replace trailer-mounted welder	40	0	40					20
Replace trailer-mounted compressor	70	0	70					70
Replace trailer-mounted 50 KW generator	40	0	40					40
Replace portable 3 KW generators	15	0	15					15
Replace heavy-duty trailer	60	0	60					60
Replace light-duty trailer	30	0	30					30
Subtotal	3,685	0	3,685	0	2,530	420	430	165
Priority 4								
Replace trailer-mounted chipper	25	0	25					25
Replace bobcat small tractor	40	0	40					
Replace steam cleaners (Hay, Conc, Rich, DC)	80	0	80		20	10	10	40
Subtotal	145	0	145	0	20	10	10	25
Priority 5								
Replace trash compactors	300	0	300	0	230	0	70	0
Category Total	29,870	350	29,520	2,845	5,990	4,575	2,985	3,930
								9,195

NOTES

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All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

III. Extensions

	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001-2002-06
Priority 1								
to Dublin-Pleasanton (1)	543,050	543,050	0					
West Dublin/Pleasanton station (2)	33,000	0	33,000		33,000			
to Pittsburg-Bay Point (3)	505,740	505,740	0					
Pittsburg-Bay Point to Railroad Ave. (4)	200,000	96,000	104,000					104,000
to Warm Springs--Track One (5)	365,900	54,000	311,900			311,900		
to Warm Springs--Track Two (5)	174,900	0	174,900			174,900		
to San Francisco Airport (6)	1,167,000	106,000	1,061,000	1,061,000				
Oakland Airport Connector (7)	149,600	1,125	148,475	5,000				
Commuter rail system (8)	TBD	0	TBD					
Subtotal	3,139,190	1,305,975	1,833,275	1,066,000	33,000	630,275	0	104,000
Priority 2								
Phase 2 and 3 Extensions								
to Antioch	TBD	3,295	TBD					
through West Contra Costa								
to Livermore								
within San Francisco								
through San Ramon Valley Corridor								
to Santa Clara County								
Subtotal	TBD	3,295	TBD					

1.3 "Total Cost" shown is programmed funding. Actual cost at completion to be determined.

2 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

Assumes funding from other than Resolution 1876 sources.

4.5 Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

5 Funding currently programmed for the Warm Springs extension totals \$385.9M, of which \$54M is expended or under funding agreement.

6 Estimated cost of proposed project in current Locally Preferred Alternative; proposed funding plan includes \$750M total from FTA (\$65M has been appropriated to date), \$99M total from the recently executed Amendment to the BART-Sam Trans Agreement, \$108M total in state funds (\$20M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$1M received to date), and \$200M from the S.F. Airport itself.

7 Cost in 1996 dollars, assuming Suspended Light Rail Transit (SLRT) technology. Will be updated when a funding plan and implementation schedule can be finalized. Project cost using alternate technologies would vary.

8 BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State recently approved BART management of the Capital Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.

Category Total

3,139,190 1,309,210 1,833,275 1,066,000 33,000 630,275 0 0 104,000

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

III. Seismic Retrofit Program									
Priority 2	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need			1997	1998	2001
				1999	2000	2002-06			
Seismic rack anchors & vehicle support tiedowns	400	0	400					400	
Seismic restraints on overhead cranes	200	0	200					200	
Engine-generators for earthquake standby power #1	4,500	0	4,500					2,400	
Engine-generators for earthquake standby power #2	2,160	0	2,160					210	
Support of Caltrans seismic work (reimbursable)	1,215	1,215	TBD						
Seismic structural evaluation of aerial structures	1,145	0	1,145					1,145	
Seismic retrofit of aerial structures	218,450	0	218,450					24,400	
Seismic sensing system upgrade	2,500	0	2,500					2,500	
Gas valve automatic seismic shut-offs	170	0	170					170	
Retrofit Transbay Tube seismic joints	620	0	620					620	
Category Total	231,360	1,215	230,145	0	28,620	25,150	25,900	143,000	

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

IV. Service Improvements

	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need				
				1997	1998	1999	2000	2001
Priority 2								
A-line traction power enhancements	21,200	0	21,200					2002-06
M-line traction power enhancements	47,550	0	47,550			2,200		19,000
C-line traction power enhancements	6,500	0	6,500			9,550		38,000
R-line traction power enhancements	22,500	0	22,500			6,500		6,500
Initial expansion of Hayward Shop	8,000	0	8,000		1,000	16,000		
Expand Concord Shop	12,442	192	12,250		1,000	7,000		
Subtotal	118,192	192	118,000	0	13,250	41,250	0	63,500
Priority 3								
Bicycle access improvements	TBD	0	TBD					
Pathfinder sign program	TBD	0	TBD					
Anti-graffiti program	580	580	0					
Hayward transit center	2,142	1,142	1,000		1,000			
BayFair transit center	1,007	1,007	0					
Concord transit center	2,318	2,318	0					
Walnut Creek transit center	2,930	2,930	0					
Daly City transit center	6,650	6,650	0					
Pittsburg parkride	1,761	1,761	0					
Asbury Station parking redesign	255	0	255	255				
System Capacity Study	300	150	150	150				
Pl. Hill parkride for I-680/24 mitigation	979	889	290	140	150			
El Cerrito Plaza access and station area improvements	5,500	5,500	0					
West Oakland access and station area improvements	TBD	0	TBD					
Fruitvale access and station area improvements	TBD	0	TBD					
Union City access and station area improvements	TBD	0	TBD					
Rockridge access and station area improvements	TBD	0	TBD					
El Cerrito Plaza transit center (AC Transit funding)	335	0	335		335			
Richmond transit center (AC Transit funding)	625	0	625		625			
Fremont transit center (AC Transit funding)	3,340	0	3,340			3,340		
Fruitvale transit center (AC Transit funding)	3,675	0	3,675			3,675		
South Hayward transit center (AC Transit funding)	1,280	0	1,280			1,280		
Coliseum transit center (AC Transit funding)	730	0	730			730		
Union City transit center (AC Transit funding)	3,060	0	3,060			3,060		
West Oakland transit center (AC Transit funding)	210	0	210				210	
New administrative headquarters building	60,238	238	60,000		30,000	30,000		
Additional Capacity Enhancement Program *	2,000,000	0	12,000,000					2,000,000
Subtotal	2,097,915	22,965	2,074,950	405	32,100	38,445	3,790	210
* Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities, in order to support an increase in daily patronage from 361,000 daily under the currently projected growth plan, to 500,000 daily under and "Additional Capacity Enhancement" program.								
Category Total	2,216,107	23,157	2,192,950	405	45,350	79,695	3,790	210

NOTES

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts, except for Rolling Stock A- and B-car renovation, which is shown on a funds expenditure basis. All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year, per MTC guidance.

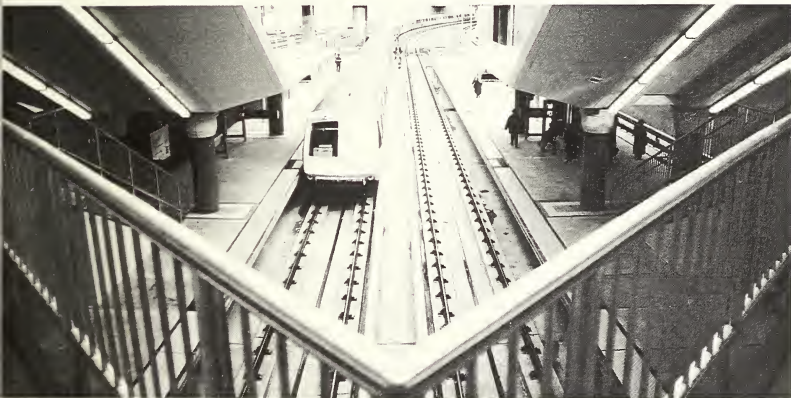
V. Research, Development and Demonstration									
	Total Cost	Funding to date	Funding Req't.	Fiscal Year Need					
				1997	1998	1999	2000	2001	
Priority 2									
Electric Station Cars demonstration	1,440	1,440	0						
Electric vehicle charging kiosk demonstration	1,100	1,100	0						
Sound mitigation/noise reduction program	TBD	350	TBD						
Superconducting Magnetic Energy Storage	TBD	350	TBD						
Adaptive diagnostic systems	TBD	75	TBD						
Traction power optimization	TBD	0	TBD						
Other	TBD	0	TBD						
Category Total	TBD	3,315	TBD	TBD	TBD	TBD	TBD	TBD	TBD

NOTES

All figures in thousands of dollars (three decimal points dropped).

CHAPTER 4

FUNDING NEEDS / PROJECT DESCRIPTIONS



System Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful life of the various components of the physical plant.

Rolling Stock Renovation

A- and B- Car Renovation

The renovation of the District's original fleet of A and B Cars is essential to enable the District to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. The A and B Cars will be 25 years old prior to renovation and have never been overhauled. The renovation will replace worn out and obsolete components and return the vehicles to their original design specifications. Systems to be replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of new car cost.

Replace Electrical Couplers on C-1 Cars

The existing "pin-type" inter-car electrical couplers on BART cars are very high maintenance items. Conversion to "button-type" couplers will reduce maintenance requirements and car out-of-service time.

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically increase the speed with which recovery from such failures can be accomplished, thereby putting temporarily disabled on-line trains back in service much faster. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

Replace A&B Car Door Components

Malfunctions of the door systems on A- and B- cars is a major factor in service disruptions, and needs to be addressed earlier than can be accomplished through the whole car renovation program. One problem is expansion of the foam comprising the door core, which then delaminates the door structures and causes jams. Another problem is corroded door suspension rails are also contributing to door failures.

Mainline Renovation

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline which have deteriorated, or will in the next ten years, due to age and use. Many components of the trackway and traction power systems are approaching 25 years old, are failing with increased frequency and must be reconditioned or replaced. Mainline renovation will prevent rail and traction power failures which would cause disruption and delays to revenue service. The highest priority Mainline Renovation projects include:

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require changeout on a three to five year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency evacuation and for maintenance crews working in subway sections. In the past, failures of fans have been experienced due to cracks that developed in the blades, causing the blades to fail. An engineering analysis was made of all ventilation fans throughout the system and it was found that the blades require replacement.

Recoat Tunnel Liner Rings and Structural Girders for Corrosion Protection

The steel rings that line BART tunnels must undergo heavy maintenance periodically, including removal of corrosion encrustation, sandblasting, and application of corrosion-resistant coating. The BART aerial structural girders and bridges have not undergone a complete rehabilitative repainting since their construction in the 1960's and early 1970's. This work is essential to avoid corrosion and consequent structural deterioration and weakness.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes which attract the forces of corrosion and are consumed in the process. These anodes must be replaced on a cycle of about every ten years.

Replace Sump Pumps in Subway Tunnels

The sump pumps which keep BART subway tunnels dry are nearly 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keep the system safe and reliable.

Replace Dry with Wet Standpipes

This ongoing project is replacing dry standpipes with "wet" (water-filled) standpipes for improved fire-fighting capability.

Asbestos Abatement

The 1989 Loma Prieta earthquake disrupted asbestos insulation in train control electronics rooms at various locations around the District. These rooms can now be entered by maintenance personnel only when fully suited up for potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive.

Traction Power Renovation

This is a long-term program to rehabilitate a wide range of traction power components and subsystems as these items continue to age and deteriorate, leading to lower reliability and higher potential for service disruption. Individual items will include reconditioning of rectifiers and replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, switch enclosures, and gas-pressure cable pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system have been identified as being in critical need of repair. The roofs are constructed of steel decking and in some cases, have rusted completely through. Water incursion into substations can result in traction power failures and serious service disruption.

Track Embankment Upgrade

This project will correct and upgrade a faulty, eroding track embankment situation between Union City and Fremont Stations.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or due to vandalism. This is a critical safety item.

Mainline Renovation also includes the following representative projects:

- Repair of damaged portions of subway tunnel under the Lake Merritt Channel.
- Repair of damage in San Francisco approach tunnel.
- Replace surfaces at right-of-way maintenance set-on points.

Stations Renovation

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. The highest priority Stations Renovation projects include:

Replace Automatic Fare Collection Equipment

The Automatic Fare Equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore difficult and costly to maintain, and should be replaced based on life-cycle analysis. Total system replacement is currently estimated to cost on the order of \$100 million, which may be more than will be available in the near-term. The project, as currently defined at a cost of \$40 million, will replace faregates, ticket vendors and addfares in those stations with the highest passenger traffic volumes, and recondition the old equipment for use elsewhere in the system. The project needs to be done in order to: decrease revenue collection and maintenance costs through use of more modern servicing modules; increase revenue security and accountability through use of sealed coin and bill units; implement an upgraded Data Acquisition System; and increase equipment availability for customers through greater reliability and maintainability. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as existing equipment approaches the end of its useful service life. To the extent that the regional multi-operator Translink "universal" ticket program is integrated with BART fare equipment, there is additional rationale for a reliable, modern AFC system.

Accessible AFC Equipment (ADA compliance)

This project will bring the BART Automatic Fare Equipment system into compliance with ADA requirements.

Credit-Debit Vendors

This project is providing new farecard vending equipment in a number of high volume stations to permit the sale of high value farecards with both credit and debit bank cards.

Station Security Program

This project is increasing the illumination levels of surface parking lots, adding emergency police callboxes in parking lots, improving police radio communications in multi-level parking structures, and providing decentralized headquarters structures to accommodate community-based deployment of BART police forces.

Replace and Rehabilitate Escalators and Elevators

Other than at Embarcadero Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads,

particularly in the various downtown subway stations. After more than 24 years of use and wear-and-tear, they are becoming unreliable, a major source of patron dissatisfaction, and uneconomical to maintain and repair on a routine basis. Several of the most unreliable will to be replaced, and all of the others will be completely reconditioned.

Replace Maps and Signs in Stations

This project will update and replace the current porcelain enameled maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project will provide a graphic display system that is more flexible and more easily updated than the current maps which have not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations and are delaminating from the platforms as well. They need to be replaced to remain safe, functional, and in compliance with ADA.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment must be renewed in order to protect the safety of those who use the stairs, especially during wet weather.

Key Station (ADA) Accessibility Improvements

These projects are providing federally-mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for the supply of accessible car and van parking. These projects are needed to comply with Americans With Disabilities Act (ADA) requirements and to improve passenger safety.

Renovate Station Elevator Components

This project is renovating stations elevators which have been in service for almost 25 years. The project is necessary to make the elevators more reliable and safe. Due to the age of the elevators, trouble calls are increasing and equipment is out of service for longer intervals, causing inconvenience to passengers, especially the elderly and mobility-impaired.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the

BART system opened almost 25 years ago. They are becoming increasingly unreliable and uneconomic to maintain. These pumps must be functional as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to begin to lift and create potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. It is necessary to reconstruct the sub-surfaces to allow a stronger bond for the tiles.

Repair Concrete Roof of Lake Merritt Station

This project will repair the structurally deteriorated concrete roof and replace waterproofing over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof has caused water leakage in the south stairway area making it necessary to close that stairway whenever it rains. The water intrusion will also corrode the reinforcing steel in the concrete roof causing further structural deterioration. Implementation of this repair work will restore the structural integrity of the concrete roof and provide safe and uninterrupted patron access between mezzanine and platform levels.

"Mint Stations" Program

This is a multi-year program to improve the passenger experience in the BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted, retiled as necessary. Weather-protection canopies and windbreaks are being renovated as needed. Repairs are being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Energy Conservation Lighting Retrofit in Stations

The 25 year old lighting systems in most BART stations consume far more electricity than equivalent modern systems. This project would replace those outdated systems with new equipment which would generate substantial energy conservation and consequently significant operating savings.

Modify Change Machines

The change-making machines throughout the BART system are being retrofitted to provide better reliability and improved cash collection efficiency.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards,

protect equipment and furnishings, and avoid structural damage, roofing must be replaced on a periodic basis.

Refurbish and Install In-Storage Faregate Units

The District has 30 faregate units in long-term storage, which are being refurbished and installed at various locations where exit faregate queuing problems occur.

Replace Bike Lockers

The bicycle storage lockers at stations have deteriorated to the point of not providing an acceptable level of security and weather protection, and are being replaced.

Replace Bus Transfer Ticker Machines

The machines in BART stations which issue transfer tickets are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus service. These machines are being replaced.

Refurbish Station Agent Consoles

The electronics in the station agent consoles are still the original installations. Most of these electronics are obsolete and are no longer supported by manufacturers, making the maintenance of these increasingly unreliable units time-consuming and excessively expensive.

Replace Lentel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts (lentels) which are cracking and deteriorating due to vibration. This project would replace those lentels with a different type of structure less susceptible to vibration damage.

Replace/ Recondition Station Public Address Systems

This project would recondition or replace, as warranted, public address systems at those stations where the volume and/or voice quality of the existing installation has deteriorated to the point of not being able to provide an acceptable level of information to patrons.

Controls & Communications Renovation

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. The highest priority Controls & Communications Renovation projects include:

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems included in this budget are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project is needed to replace the 24-plus year old computers running the DAS and DSS systems and the 14-year old CCS computers.

Replace Radio Network

This project is furnishing and installing a systemwide multi-frequency, trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The current radio system has several significant shortcomings, both in terms of capacity and reliability, which have frequent negative operational impacts and occasionally affect safety. BART has already been assigned broadcast frequencies, which are increasingly difficult to obtain. This project is being implemented through an innovative joint development program with private sector financing.

Advanced Automatic Train Control

This project is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project would allow system throughput to increase from the current 17 trains per hour up to 30 trains per hour. The system will be one which can be installed over the existing control equipment with relative ease and no service disruptions. The project will help BART to meet the increased demands on the system as headway reductions become necessary in the future.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. In addition, the extensions budgets provide for an increase in the number of work stations overall. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Replace Maintenance Vehicle Detection Devices

This project is replacing the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These vehicle detection devices are required to allow Central Control to observe the location of on-track maintenance vehicles. This detection system serves as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The units presently being used have been in service over 24 years and failure rates are increasing. When a failure occurs, the high-rail maintenance vehicle must be removed from mainline track, per PUC requirements, resulting in non-productive time in maintenance work schedules requiring single tracking.

Wayside Train Control Renovation

This is a long-term program to replace vital wayside train control components and subsystems which are becoming unreliable due to age and difficult to maintain due to obsolescence. Most of these components are no longer being produced and are no longer supported by manufacturers. If this work is not completed in a timely manner, essential train control hardware failures will lead to extensive disruption of service. This program will also replace the Sequential Occupancy Release System, (SORS). SORS is a Public Utilities Commission required back-up safety system to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the vital train control system. The primary SORS computer is almost 25 years old, is obsolescent, and becoming difficult to maintain. This safety critical system must remain operational and reliable.

Electronic Display Destination Sign Replacement

The electronic dot-matrix signs which display the destination of trains arriving in stations, as well as other passenger information, are almost 25 years old, unreliable, and no longer supported by the manufacturer. This project will replace those sign units with modern, highly reliable equipment which also provide greater flexibility in the formatting of information displays.

Reverse Running In Transbay Tube

Existing train control electronics currently restrict reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification is providing the necessary signaling to allow up to three trains simultaneously in the Tube.

Second Communications Specialist Position In Central Control

As the extensions become operational and the number of trains on-line increases, it will become necessary to have a second position from which BART communications specialists can make essential announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MARIS

This project is replacing the District's 25 year old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Replace Yard Voice Recorders

Located in each train storage and dispatch yard are multi-channel voice recorders which record all communications regarding train movements. This information can be critical in determining exactly what occurred in the event of any sort of accident involving trains in the yards. The existing units are becoming unreliable and hard to maintain.

Shop & Yards Renovation

The purpose of this program of projects is to address the deterioration of the shops and yards due to more than two decades of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. These projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance, and by reducing vehicle out-of-service time and keeping as many vehicles in service as possible, thereby reducing train crowding; make the shops and yards safer places in which to work; provide cost savings to the District by reducing maintenance turn-around time and eliminating travel time to and from vendors; and improve the efficiency of the shops and yards by providing employees with dependable equipment needed to perform their duties effectively. The highest priority Shops & Yards Renovation projects include:

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all repairable parts in support of all transit vehicles, station and field equipment, and AFC equipment. Failure to provide for these requirements could lead to vehicles out-of-service and potential disruption to normal maintenance and service operations. This on-going need must be funded annually.

Replace Wheel Truing Machine

This project, nearing completion, is replacing a 23 year old wheel truing machine in the Hayward Shop. The new, more reliable and higher capacity truing machine will allow the District to go to a higher standard of preventive maintenance for wheel profiles and will result in increased productivity and lower load factors since fewer cars will be held out-of-service waiting for wheel re-profiling. A second machine was also recently installed at the Richmond Shop.

Hayward Shop Rehab/Equipment Replacement

This project will rehabilitate the shop and replace maintenance equipment to support BART's aging fleet. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars will be held out of service for repairs in the future.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants, and provides minimal renovation of shop heating and cooling systems.

Central Receiving and Distribution Warehouse Facility

The District will face increased need for inventory of materials as the new system extensions come on-line, as the size of the operating fleet increases, and as parts must

be stocked for A and B cars as configured both before and after renovation. A new central receiving and distribution warehouse facility will meet those needs.

Replace Parts Washing Facilities in All Shops

This project replaces parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities if found not to be in compliance.

Employee Facilities Improvements

The infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building have not changed materially since the BART system opened. This project will provide basic essential reconditioning and remodeling as needed to provide acceptable work environments.

Overhaul Transit Vehicle Washers

The facilities used to wash the exterior of transit vehicles are still the original installations. They are becoming increasingly inefficient, and do not comply with current standards for containment and treatment of chemical-laden waste water. This project will bring the washers back up to design specifications and provide acceptable control of waste.

Reconfigure and Renovate Transportation Buildings

These buildings at the train dispatch yards provide the essential administrative facilities for on-site train operations, as well as lunch/breakrooms, locker rooms, and other support facilities for on-duty train operators. The current configuration of these buildings is inadequate to serve the increased number of operators required to operate higher levels of service associated with the new system extensions. At the same time, the existing structures will be reconditioned and remodeled as necessary, as in the Employee Facilities Improvement project.

Yard Fuel Tanks

This project will install 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement which will eliminate the need to bring maintenance vehicles from these outlying yards all the way into the Oakland Yard, as is now the case, to refuel.

MetroCenter Building Fuel Tank

The 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is no longer in compliance with regulations for underground fuel storage. BART has been ordered by Alameda County to replace the tank.

Yard Efficiency Improvements

This project will reconfigure trackwork at the Richmond Shop to improve staging and routing of cars to the new wheel truing machine to be installed there.

Replace Roofing On Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as they deteriorate due to age and exposure.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lift units must be assured through periodic reconditioning.

Shops & Yards Renovation also includes these other representative projects:

- Add a second wheel/axle press.
- Replace shop sump pumps.
- Replace the shop roll-up doors.
- Improve security at the Richmond Yard complex.

Work Equipment

The purpose of this program is to replace worn and obsolete maintenance and service vehicles and maintenance equipment. This equipment includes such items as tools, power generator sets, light towers, grounds and buildings maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police and personnel sedans, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from use. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate. The highest priority Work Equipment Replacement project is the replacement of gasoline-powered maintenance equipment used in subways with electrically-powered equipment, as required by CalOSHA tunnel safety orders.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by rail but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Castro Valley and Dublin/Pleasanton

This project is a 13.8 mile double track extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project in the Dublin-Pleasanton area. This project has been under construction for several years, and is scheduled to open in 1997. There will ultimately be three stations along the extension: one in Castro Valley located at I-580 and Redwood Road; a second station at West Dublin-Pleasanton near Stoneridge; and the third one at East Dublin-Pleasanton near Hacienda Business Park. Funding for the West Dublin/Pleasanton Station has not yet been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8 mile double track extension, and will have two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements will be made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point is scheduled to open in the second half of 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

San Francisco Airport

The proposed San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at Hickey, Tanforan, and Millbrae. This extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient transportation link between BART and CalTrain and to the West Bay communities.

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in

Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District. This extension will move BART further toward Santa Clara County and be an important step in "ringing the Bay".

Other Extension Projects

Oakland Airport Connector

The Oakland Airport Connector Project will directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project, and anticipates possible future selection to proceed to a second phase, preliminary engineering and environmental documentation. Other technologies and funding sources are also being evaluated.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with the expected host communities, and will pursue funding for further planning and development of these projects, but funding constraints indicate that their implementation will not be likely within the ten year timeframe of this current capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors faster than the BART system itself can be extended, is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area. This program would utilize existing equipment (leased or purchased) and trackage rights in order to implement service within two years of funding approval. BART and other local, regional, and state agencies are together developing strategies, including phased implementation, to identify and secure funding sources.

Seismic Retrofit Program

The purpose of this program of projects is to bring the existing system up to the latest seismic standards to enhance the system's ability to safely endure severe earthquakes and quickly return to service by:

- ◆ Improving the structural strength of BART's aerial structures and Transbay Tube joints in order to withstand greater seismic forces.
- ◆ Improving the system of seismic detectors which slows or stops trains in the event of an earthquake.
- ◆ Installing automatic seismic gas shut-off valves.
- ◆ Providing engine-generators for the event of a possible PG&E power loss.
- ◆ Provide restraints for overhead crane structures at maintenance shops.
- ◆ Provide tie downs for the stands that transit vehicles are supported on during maintenance at the shops.

The structural strengthening components of this project will bring existing structures up to current seismic standards, and improve the ability of the system to withstand major earthquakes with little or no damage. Other components of this project will augment earthquake preparedness systems already in place to provide more coverage, more detailed and accurate information, and to permit faster response to protect the safety of the rail system, its patrons and employees.

Service Improvements Program

Reconfigure, Rehabilitate & Enlarge Hayward and Concord Shops

The increasing size of the operating fleet requires that the heavy maintenance facilities at these two shops be reconfigured, rehabilitated and expanded in order to increase their efficiency adequate to properly maintain the expanded fleet. These expansions are also essential to reducing the amount of time cars are held out of service for maintenance and repairs.

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate patronage growth to 361,000 daily trips. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate growth to 500,000 daily trips. The Additional Capacity Enhancement subprogram is conceptual and still under development, but it would include additional transit vehicles; additional traction power and train control renovation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities beyond the projects listed separately in this *Capital Improvement Program*. This cost indicated for this item provides a preliminary estimate of what these additional improvements might entail.

West Oakland Access and Station Area Improvements

This project would be constructed in the area near West Oakland Station that is being considered for use by other agencies for the Cypress Corridor freeway replacement and inter-city rail service. The scope, cost and schedule for the project is subject to the results of these various planning activities.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Hayward, BayFair, Concord, Walnut Creek, and Daly City Transit Centers

These projects will improve traffic circulation in the vicinity of these stations, and will improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities. These projects are funded with Section 9 and STP/CMAQ, and state funds, and are underway.

AC Transit-Funded Transit Centers

AC Transit has applied for funding from a variety of sources to construct transit centers, as described above, at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South

Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations. BART will implement these projects should they secure funding.

New Administration Building

This project would acquire a new administration building large enough to accommodate all of the District's administrative employees in a centralized location. It is often necessary for BART employees to conduct business with each other in person. Staff time could be used much more productively if employees did not have to travel among BART's various locations throughout Oakland in order to get things done. The acquisition of a new administrative building would improve efficiency and productivity.

Research, Development & Demonstration

Superconducting Magnetic Energy Storage (SMES)

Two related projects are intended to study the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains at closer headways to support projected future service levels. Two different approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations) and high temperature superconducting materials.

Electric Station Cars

The District is funded for a demonstration program to purchase 45 electric cars to be used by BART and PG&E employees for access to and egress from stations. The project will demonstrate that with "station cars", transit can provide an all electric door-to-door service that will attract new patronage.



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1998-2008
draft
San Francisco Bay Area Rapid Transit District

CAPITAL IMPROVEMENT PROGRAM

*July 1997 Through June 2008
Fiscal Years 1998 - 2008*

DOCUMENTS DEPT.

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June 27, 1997

MARGARET K. PRYOR
PRESIDENT

JAMES FANG
VICE-PRESIDENT

THOMAS E. MARGRO
GENERAL MANAGER

DIRECTORS

DAN RICHARD

Enclosed for your review and comment are drafts of BART's FY98 Short Range Transit Plan (S RTP) and draft FY98 Capital Improvement Program (CIP).

As part of the process of finalizing these documents, a public meeting is

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June 27, 1997

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GENERAL MANAGER

DIRECTORS

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5TH DISTRICT

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6TH DISTRICT

WILLIE B. KENNEDY
7TH DISTRICT

JAMES FANG
8TH DISTRICT

TOM RADULOVICH
9TH DISTRICT

Enclosed for your review and comment are drafts of BART's FY98 Short Range Transit Plan (S RTP) and draft FY98 Capital Improvement Program (CIP).

As part of the process of finalizing these documents, a public meeting is scheduled to be conducted at the August 14, 1997 BART Board of Directors meeting. This meeting will begin at 9:00 a.m. in the BART Board Room at 800 Madison Street, Oakland (located directly above Lake Merritt Station). At that time, verbal comments on the draft S RTP and CIP will be accepted.

Written comments for both documents may be submitted by August 14, 1997 to the following addresses:

Draft FY98 S RTP Comments

BART, MSQ-306

Financial Planning Division

800 Madison Street

Oakland, CA 94607

Draft FY98 CIP Comments

BART, MSQ-302

Capital Budgets Division

800 Madison Street

Oakland, CA 94607

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1998 - 2008

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration under the Federal Transit Laws, 49 U.S.C. Chapter 53 and passed through the Metropolitan Transportation Commission. This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation, and does not preclude future labor contract negotiations or future BART Board deliberations regarding fares.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

This report was researched and prepared by:

Dale Fousel, Kin Cheung, and Richard Golden

Capital Budgets Division
Department of Capital Development & Control
San Francisco Bay Area Rapid Transit District

Draft -- June 3, 1997

Chapter 1

CONTEXT AND ORGANIZATION OF THE PROGRAM

Context of the Program

BART faces significant challenges as it prepares to enter the 21st Century with this *Capital Improvement Program*. The District is preparing to start work on a billion dollar extension to the San Francisco International Airport, while at the same time undertaking an unprecedented program of rehabilitating and upgrading the existing system, and improving system accessibility -- all while maintaining and even improving the level of service provided.

An Aging System: The Systemwide Renovation Program

When BART initiated service in 1972, it was state-of-the-art: the most modern, most automated rail transit system in the world. Now, 25 years later, BART is no longer the same sparkling new system. Recognizing this fact, in 1995 and 1996, BART began a major program of system renovation to ensure that service does not deteriorate in the future.

BART now carries more than twice as many passengers daily than in its early years, patronage is still growing, and the equipment is aging. This combination puts the BART system at risk if the District is not able to continue implementing its renovation program expeditiously. Most of the hardware that comprises the BART rail system will reach the end of its operational lifetime over the next few years unless it is rebuilt, reconditioned, or replaced. Renovation funding requirements are generated from a planned replacement cycle based on useful life. Examples of the aging of the BART system include:

- the typical BART railcar has accumulated over a million miles of travel;
- the doors on a typical car have cycled more than three million times;
- nearly a billion people have been transported in these vehicles, used the farecard vendors, activated the faregates, and ridden the escalators or walked the stairs;
- many of the electronic and computer systems which heralded a new era of rail transit technology a generation ago are now becoming obsolete, and therefore increasingly difficult and expensive to maintain.

This onset of aging makes it essential for BART to rebuild before it experiences the declining spiral of effects that many older rail transit systems have suffered due to their inability to attend to preventative maintenance and renovation in a timely manner. This

is not glamorous, high-visibility work, and it is very expensive. But it is essential, and in the long run ***it is much more cost effective to rehabilitate systems before reaching the point of failure than to try to fix problems after they become obvious.*** This will also avoid future degradation of service and consequent loss of patronage and fare revenue.

BART must not only maintain its current level of service while undergoing both expansion and rebuilding, but also provide even higher levels of service to meet the needs of a growing market. To provide reliability at higher levels of service, this *Capital Improvement Program* reflects the need for major renovation for stations; transit vehicles; train control, power, and communications systems; maintenance facilities; and many other parts of the BART physical plant.

A Growing System: Planned Growth and New Services

BART system patronage is expected to continue to grow in the future, both in terms of real growth on the existing core system and as a result of the opening of additional line segments and stations. Patronage is projected to grow more than 39 percent over the term of this document's planning horizon, from 76.9 million trips in 1997/1998 to 107.0 million trips in 2007/2008. This will require additional facilities and capabilities. While BART invested heavily in increasing its people-carrying capacity over the last ten years, continued growth in patronage will require continued capacity expansion. In order to accommodate forecast growth, this capital program calls for improved facilities for feeder bus access; more reliable escalator, elevator and fare processing equipment; an advanced system of automatic train control to increase the frequency of train service and improve service reliability; and additional maintenance facility capacity.

BART has completed a program of significant expansion of patron parking over the past few years. In the early 1990s, BART added more than 2,300 spaces at existing stations. Although demand for station parking continues to be a significant need, funding is not expected to be available for additional parking expansion in the foreseeable future. Over the next few years BART's station access improvement program will focus on grant-funded "intermodal" bus access projects. These projects, several of which have already been completed, will increase the capacity to handle more feeder buses at the stations, along with providing more comfortable amenities for patrons who transfer to and from buses at BART stations. A major program of improved bicycle access will get underway in the next year. In addition, a highly innovative grant-funded demonstration program involves a test of electric "station cars" as one more possible means of improving connections at both ends of BART rail trips.

Replacement of worn and unreliable escalators, elevators, and deteriorating farecard vending equipment and faregates, along with other station renovation projects

and implementation of better interoperator fare mechanisms, will improve the flow of patrons through the stations, while providing increased customer convenience.

Other projects which will both stimulate and help accommodate patronage growth include new line extensions and stations. The extensions to Colma and North Concord/Martinez both opened in the winter of 1995/1996. The further extension from North Concord/Martinez to Pittsburg/Bay Point opened in December 1996, and the new branch line to Castro Valley and Dublin/Pleasanton opened in May 1997. Substantial progress is being made in the planning, design, and funding of the proposed extension from the new Colma Station to San Francisco International Airport. Construction of that billion dollar project is planned to begin in 1997/98.

The District remains committed to the planned Phase 2 and 3 extensions of BART rail service to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. Anticipated funding limitations during the next ten years will almost certainly push their completion beyond that time frame. As a near-term interim solution, a network of commuter rail service using conventional diesel locomotives and standard passenger railcars could be placed in service in these same extension corridors at much lower costs and within two years of funding approval.

An Accessible System: Americans With Disabilities Act Compliance

The BART system has been hailed as a model of public transit accessibility for persons who are elderly and/or disabled, ever since the system began operation. To this day BART remains one of the most accessible rail systems in the world. But the federal Americans With Disabilities Act (ADA) has set even more comprehensive standards than those currently offered by BART or any other rail transit agency in the world. BART is moving aggressively to implement projects necessary to come into compliance with the new regulations.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized, and an additional category of other financial obligations. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Facilities
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project has been assigned a priority level, independent from its funding availability status. Priorities for each project are outlined in Chapter 3 (Project Listings: Funding Needs and Priorities). Priorities range from a high of 1 to a low of 4, based on law and regulation; or degree of criticality to safety, reliability of service, maintenance operations, operation of the extensions, and service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted, or essential to ensure operation performance of the extensions lines.

- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted, or introduction of technological advancements which significantly improve operational performance or result in significant cost efficiencies.
- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed, District goals will not be achieved.
- 4 Routine replacement of worn or obsolescent equipment or systems, desirable system improvements, or reduced maintenance costs.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the risk to operations, safety, or impact on operating costs.

Funding Availability Status

This *Capital Improvement Program (CIP)* lists all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$7.8 billion. A program of this size is currently beyond the level of funding which can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks", into which projects are assigned, based on the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects that are essential to continued safe and reliable operation of the system, and for which potential funding sources can be identified. Track Two includes projects for which the projected future levels of existing funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future, and/or the creation of new funding sources. See Chapter 2 (Funding Strategy) for more information on funding availability for various programs.

Chapter 2

FUNDING STRATEGY

BART's Capital Improvement Program (CIP) includes all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$7.8 billion. Of this total, the Track One program at a cost of \$4.9 billion is comprised of those projects for which potential sources of funding can be identified. The almost \$2.9 billion balance of the program, Track Two, serves as the basis of advocacy for increased levels of capital funding.

A summary of BART's Track One funding needs is provided in Table 1. A summary of the proposed funding sources for Track One is provided in Table 2. Details on all Track One and Track Two funding needs are shown in Chapter 3.

Systemwide Renovation Program

For 20 years after the inception of rail service in 1972, BART was considered new and state-of-the-art. Reliability improved steadily even as service levels increased. By the early 1990's, however, the effects of aging began to show up. It became apparent that stations, rail cars, and the basic system infrastructure would soon need more than just routine maintenance to continue operating reliably at ever higher levels of service. In 1993, BART evaluated the condition of the physical plant and developed a \$1.1 billion program of renovation projects needed to return the system to near-original design standards.

In 1994, as the magnitude of the program became known, BART and the Metropolitan Transportation Commission (MTC) began discussions on how to fund BART's systemwide renovation needs, resulting in joint adoption of MTC Resolution 2672. The Capital Improvement Program that BART adopted in January 1995 outlined a set of projects and a funding strategy to implement a multi-year program of rebuilding, for which Resolution 2672 and a series of planned BART bond issues formed the basis.

BART-MTC Renovation Funding Agreement (MTC Resolution 2672)

In May 1994, BART and MTC jointly adopted a cooperative funding agreement (MTC Resolution 2672) to address BART's most critical renovation needs. The agreement calls for MTC to program \$450.8 million in federal, state, and regional funds for BART renovation, and for BART to internally generate \$200.5 million as local match to the proposed grant funds. In fact, BART will have to generate substantially more than \$200.5 million in order to fund essential Track One renovation projects beyond the scope of the BART-MTC agreement.

The funding plan originally set forth in Resolution 2672 anticipated MTC programming its entire \$450.8 million commitment over the six-year period FY 1994 through FY 2000. Subsequent reductions in Congressional appropriations of transit system funding have

Table 1

Track One Program -- Funding Needs

All figures in thousands of dollars (three decimals places dropped).

Project	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002
SYSTEM RENOVATION PROGRAM								
Rolling Stock								
A- and B-car renovation	454,400	286,825	167,575	0	152,784	3,698	3,698	3,697
Other rolling stock renovation projects	11,488	10,788	700	0	0	0	0	700
Subtotal Rolling Stock	465,888	297,613	168,275	0	152,784	3,698	3,698	4,397
Mainline								
Replace running rail & accessories	30,580	5,510	25,070	2,937	3,061	1,744	4,419	463
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200	0	0	0	0	1,200
Replace sump pumps in subway tunnels	3,300	3,300	0	0	0	0	0	0
Asbestos abatement (phases 1-4)	7,144	3,353	3,791	2,500	1,291	0	0	0
Rehab traction power equipment	33,514	802	32,712	10,000	1,100	0	0	22,712
Repair Lake Merritt Channel subway structure	1,860	0	1,860	100	1,100	660	100	0
Other mainline renovation projects	25,181	20,160	5,021	400	684	718	617	1,965
Subtotal Mainline	106,103	36,449	69,654	15,937	6,136	3,122	5,036	38,323
Stations								
Automatic Fare Collection modernization	54,000	4,572	49,428	28,428	17,500	200	0	3,300
Replace 19 stations escalators	12,821	12,821	0	0	0	0	0	0
Renovate escalators systemwide	25,640	25,640	0	0	0	0	0	0
Renovate elevators systemwide	6,771	0	6,771	4,723	304	244	0	1,500
"Mint Station" program	34,243	10,026	24,217	3,285	3,129	0	0	17,803
Energy conservation systemwide	23,052	1,862	21,190	0	0	2,000	2,000	15,190
Other station renovation projects	37,417	28,289	9,128	1,395	489	503	519	876
Subtotal Stations	193,944	83,210	110,734	37,831	21,422	2,947	2,519	43,139
Controls & Communications								
Next generation control system	19,226	19,226	0	0	0	0	0	0
Fiber optic/radio network (TRACS)	60,000	0	60,000	60,000	0	0	0	0
Advanced automatic train control R&D phase	43,200	33,800	9,400	4,700	4,700	0	0	0
Advanced automatic train control implementation	52,000	0	52,000	0	26,000	26,000	0	0
Rehab wayside train control equipment	38,443	1,883	36,560	8,500	2,000	1,643	0	24,417
Replace MetroVision destination signs	1,300	1,300	0	0	0	0	0	0
Replace Digital Transmission System	4,000	0	4,000	0	0	0	0	4,000
Other controls and communications projects	17,826	8,304	9,522	845	798	822	846	5,339
Subtotal Controls & Communications	235,995	64,513	171,482	74,045	33,498	28,465	846	33,756
Facility Renovation and Replacement								
Non-stock inventory (repairable parts provisioning)	30,412	2,412	28,000	1,800	1,900	2,000	2,200	17,700
Hayward shop traction motor repair facility reconfiguration	1,995	1,995	0	0	0	0	0	0
Employee facility improvements	2,212	212	2,000	1,566	434	0	0	0
Richmond Shop & Yard security improvement	1,067	1,067	0	0	0	0	0	0
Replace roofing on shops, towers, etc.	3,600	0	3,600	0	400	0	0	3,200
Other shop and yard renovation projects	14,359	10,647	3,712	1,170	455	180	185	1,531
Subtotal Facility Renovation and Replacement	53,645	16,333	37,312	4,536	3,189	2,180	2,385	22,431

Table 1 (cont.)

Track One Program -- Funding Needs (continued)

All figures in thousands of dollars (three decimals places dropped).

Project	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002
SYSTEM RENOVATION PROGRAM (cont'd)								
Work Equipment	34,432	6,201	28,231	3,810	2,700	2,700	1,664	0
Work equipment projects	34,432	6,201	28,231	3,810	2,700	2,700	1,664	0
Subtotal Work Equipment								17,357
Subtotal System Renovation Program	1,090,007	504,319	585,688	136,159	219,729	43,112	16,148	159,403
EXTENSIONS PROGRAM								
to Colma	170,179	170,179	0	0	0	0	0	0
to Dublin-Pleasanton	543,050	543,050	0	0	0	0	0	0
to Pittsburg-Bay Point	505,740	505,740	0	0	0	0	0	0
to San Francisco Airport	1,167,000	79,811	1,087,189	1,087,189	0	0	0	0
SFO CAPRA	72,000	0	72,000	4,650	0	2,850	64,500	0
Power substation for SFO	12,500	0	12,500	12,500	0	0	0	0
to Warm Springs	702,430	55,400	647,030	0	7,000	17,000	17,000	14,000
West Dublin/Pleasanton station	39,370	0	39,370	0	0	0	0	39,370
Oakland Airport Connector	198,590	0	198,590	0	3,000	8,000	0	187,590
Pittsburg-Bay Point to Railroad Ave.	96,000	96,000	0	0	0	0	0	0
Extension planning	4,002	4,002	0	0	0	0	0	0
Subtotal Extensions Program	3,510,861	1,454,182	2,056,679	1,104,339	10,000	27,850	81,500	818,990
SEISMIC RETROFIT PROGRAM								
Seismic retrofit projects	158,801	2,258	154,543	0	0	0	0	154,543
Subtotal Seismic Retrofit Program	158,801	2,258	154,543	0	0	0	0	154,543
SERVICE IMPROVEMENT PROGRAM								
Expand Concord Shop	14,442	192	14,250	1,800	11,863	0	0	587
Initial expansion of Hayward Shop	8,000	0	8,000	0	0	0	0	8,000
Anti-graffiti program	580	580	0	0	0	0	0	0
Bicycle access improvements	704	704	0	0	0	0	0	0
Transit centers	13,414	13,414	0	0	0	0	0	0
Other service improvement renovations	24,363	24,015	348	348	0	0	0	0
Subtotal Service Improvement Program	61,503	38,905	22,598	2,148	11,863	0	0	8,587
RESEARCH, DEVELOPMENT AND DEMONSTRATION								
Research, development and demonstration projects	4,125	4,125	0	0	0	0	0	0
Subtotal Research, Development and Demonstration	4,125	4,125	0	0	0	0	0	0
OTHER FINANCIAL OBLIGATIONS								
Other financial obligations	96,439	1,309	95,130	94,410	80	80	80	400
Subtotal Other Financial Obligations	96,439	1,309	95,130	94,410	80	80	80	400
TOTAL TRACK ONE FUNDING NEEDS								
	4,919,736	2,005,098	2,914,638	1,337,056	241,672	71,042	97,728	25,217
								1,141,923

Table 2

Track One Program -- Proposed Funding Sources

All figures in thousands of dollars (three decimals places dropped)

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed				
				1998	1999	2000	2001	2002-08
SYSTEM RENOVATION & OTHER PROGRAMS								
Funding per MTC Res. 2872								
Federal Sec. 3	239,472	239,472	0	0	0	0	0	0
Federal CMAQ/STP	30,000	15,000	15,000	5,000	0	5,000	0	0
State Prop. 108	15,000	15,000	0	0	0	0	0	0
State TCI	8,474	1,974	6,500	1,065	0	0	0	5,435
MTC bridge tolls	24,000	12,000	6,000	4,000	4,000	0	0	0
Section 9 for AFC and rail	45,087	8,881	36,408	7,350	18,931	1,398	3,536	370
Unprogrammed Section 9	10,763	0	10,763	0	0	0	0	10,763
Unprogrammed Federal STP/CMAQ	25,000	0	25,000	0	0	0	0	25,000
Unprogrammed Federal Section 3	8,000	0	8,000	0	0	0	0	8,000
Unprogrammed MTC net bridge toll revenues	15,000	0	15,000	0	0	0	0	15,000
Unprogrammed forecast post-TIP programming	32,000	0	32,000	0	0	0	0	32,000
BART 1995 bond proceeds	129,000	102,624	26,376	26,376	0	0	0	0
BART 1995 bond proceeds	71,505	0	71,505	71,505	0	0	0	0
Planned BART 1998 bond proceeds	71,505	0	71,505	115,296	22,931	10,398	8,536	370
Subtotal	651,300	394,751	256,550	115,296	22,931	10,398	8,536	99,022
Other Funding								
Pre 1995-Reserves	74,143	61,616	12,527	12,527	0	0	0	0
Planned BART 1998 bond proceeds	131,495	0	131,495	82,054	49,441	0	0	0
Planned BART 1999 bond proceeds	129,000	0	129,000	0	126,181	1,146	643	82
Energy conservation financing	21,190	0	21,190	0	0	2,000	2,000	15,190
R&D grants	3,363	3,363	0	0	0	0	0	0
Non-2872 grants	60,688	60,688	0	0	0	0	0	0
State TCI	1,155	0	1,155	0	0	0	0	0
DARPA (AATC)	19,500	19,500	0	0	0	0	0	0
Private sector (AATC)	11,000	11,000	0	0	0	0	0	0
STIP and bridge toll grants (AATC)	52,000	0	52,000	0	26,000	26,000	0	0
Allocations from operating budget per SRTP	76,303	0	76,303	8,053	3,800	0	2,150	8,100
1995 Safe Harbor Lease proceeds	1,648	0	1,648	1,648	0	0	0	0
Interest earnings	21,550	0	21,550	12,391	1,709	3,700	2,900	665
New Measure A	154,543	0	154,543	0	0	0	0	185
New Measure B for seismic retrofit	154,543	0	154,543	0	0	0	0	154,543
Subtotal	757,574	156,165	601,409	117,826	207,131	32,846	7,693	225,086
SUBTOTAL SYSTEM RENOVATION & OTHER PROGRAMS								
	1,408,874	550,916	857,959	233,122	230,062	43,242	16,229	324,088
EXTENSIONS								
Funding for Colima extension (FFGA)	170,179	170,179	0	0	0	0	0	0
Funding for Dublin-Pleasanton extension	543,050	543,050	0	0	0	0	0	0
Funding for Pittsburg-Bay Point extension	505,740	505,740	0	0	0	0	0	0
Funding for San Francisco Airport extension	1,167,000	79,811	1,087,189	1,087,189	0	0	0	0
Dedicated bond issue for SFO CAPRA	64,500	64,500	0	0	0	64,500	0	0
Allocations from Operating for SFO CAPRA	7,500	0	7,500	4,650	0	2,850	0	0
Dedicated bond issue for power substation for SFO	12,500	0	12,500	12,500	0	0	0	0
New Measure B funding for Warm Springs extension	299,700	0	299,700	0	0	0	0	299,700
Other grants for Warm Springs extension	402,730	55,400	347,330	7,000	7,000	17,000	14,000	10,000
New Measure B funding for West Dublin/Pleasanton station	35,070	0	35,070	0	0	0	0	292,330
Other grants for West Dublin/Pleasanton station	4,300	0	4,300	0	0	0	0	35,070
New Measure B funding for Oakland Airport Connector	120,000	0	120,000	0	0	0	0	4,300
Other grants for Oakland Airport Connector	78,590	0	78,590	0	3,000	8,000	0	120,000
Existing Measure C funding for Bay Point to Railroad Ave. ext.	96,000	0	96,000	0	0	0	0	67,590
Extension planning previous BART reserves	4,002	4,002	TBD	0	0	0	0	0
Subtotal	3,510,861	1,454,182	2,056,679	1,111,339	10,000	27,850	78,500	818,990
TOTAL TRACK ONE PROGRAM								
	4,919,735	2,005,098	2,914,638	1,344,461	240,062	71,092	94,729	1,143,078

led MTC to reduce its forecast of funds expected to be available to the Bay Area region, and therefore to BART, over the period of this CIP. MTC's current funding projections for BART extend the period for commitment of the agreed upon funds for BART system renovation.

For example, annual programmed amounts of Section 3 funds for renovation of the A- and B-cars have been changed from the original plan, with the receipt of the full amount of programming consequently extended from FY 2000 to FY 2004. In addition, reductions in the federal Section 9 program have required MTC to identify other grant funds to replace some of the planned Section 9 funds for non-car portions of the BART renovation program. A significant portion of the Res. 2672 grant funds for systemwide renovation other than the car program are not currently expected to be programmed until after FY 2002.

Generation of BART Funds

The CIP adopted in January 1995 outlined the need for BART to issue bonds to match and supplement grants for the Systemwide Renovation Program. That CIP proposed bond issues for the spring of 1995, 1997, 1998 and 1999 to generate a total of approximately \$400 million. The source of debt service funds for this planned borrowing was proposed as a series of fare increases in 1995, 1996 and 1997 to fund the first \$200 million in bonds, and future revenue enhancement and/or cost reductions to fund the last \$200 million.

The first bond issue was sold in May 1995, netting \$129 million. The current plan is to merge the 1997 and 1998 issues, and issue it in the winter of 1997/98 in the amount of \$203 million. Financial projections carried in the companion document *Short Range Transit Plan* indicate that the combined debt service for the 1995 and 1997/98 bond issues for renovation can be sustained through a combination of the revenue produced by the series of three fare increases recently completed and modest cost containment measures. The proceeds of these bond issues will be used to provide local match for A/B car and other renovation grants, for retirement of previous debt for the purchase of C-2 cars and the telecommunications project, and to advance other renovation projects.

Track One Systemwide Renovation Program

As noted above, BART has defined a program of essential renovation requiring \$1.1 billion between inception of the program adopted in 1995 and the end of this CIP timeframe (FY 2008). Of this \$1.1 billion need, approximately 40 percent has been secured, and potential funding sources can be identified for the projects in the remaining balance of the program. The proposed funding sources are summarized in Table 2. Details for several major elements of the program are described in the following section.

A- and B-Car Renovation Program

The largest single component of the systemwide renovation program is the rebuilding of the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort is \$454,400,000. The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in federal Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in bridge toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$144 million.

The funding plan for this project is covered by a Federal Transit Administration (FTA) Letter of No Prejudice (LONP), which permitted BART to execute a contract for performance of renovation work in advance of actual receipt of most of the grant funds. The contract is comprised of a base order for renovation of the first 200 cars, fully covered by the LONP, and an option for the remaining 239 cars as additional funding becomes available. This CIP forecasts availability of funding and execution of the option in FY 1999.

Other System Renovation Projects

Renovation of the remainder of the BART infrastructure (stations, power and train control systems, maintenance facilities, etc.) will be accomplished through a variety of funding sources. Through Resolution 2672, MTC has pledged to attempt to program \$140.8 million, to be matched by \$56.5 million from BART. Other grant sources and BART revenues will be required for the remaining balance. Detail on the funding program for several large projects is provided below.

Automatic Fare Collection (AFC) Equipment Modernization

After 25 years in service, BART's AFC equipment must be modernized through a combination of replacement and renovation. This project will cost \$54-65 million, depending on the specific implementation program, yet to be decided. To date, \$25.8 million in federal Section 9 funds have been programmed over several years. BART will seek additional Section 9 programming for this project and is also applying for state STIP funding. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Rail Replacement

As train wheels grind against rail, especially on curves, the rail gradually wears away and must be replaced. This is a major, ongoing effort estimated to cost \$30.6 million by FY 08. A minimum of \$19.3 million in federal Section 9 funding has been programmed in a series of grants. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Advanced Automatic Train Control

This project is integral to BART's proposed future service plans, and also will displace a significant amount of renovation that would otherwise be required on the existing train

control system. The research and development phase is being carried out with a combination of federal defense conversion funds, matched by private sector and BART funds. Funding for implementation of AATC on the M- and upper A-lines (\$52 million) is being sought through grant sources.

Energy Conservation Program

This \$21.2 million renovation program is designed to reduce BART's use of electric power in stations, maintenance buildings, and administrative buildings. There is considerable potential for long-term operating budget savings if energy consumption can be reduced through such a program. BART is exploring the possibility of contracting with private vendors interested in advancing the capital cost of this renovation, with repayment to be made from the avoided future operating costs.

Escalator and Elevator Program

Replacement of many of the most critical station escalators, and complete renovation of other escalators and station elevators systemwide, are among BART's highest priority renovation programs. These programs, totaling \$45.2 million, have not competed well for grant funds in the past, so these efforts are proposed to be carried out primarily with BART revenues. Grant sources will continue to be pursued, but these projects must be carried out immediately, and will be funded from BART sources as necessary to keep them moving.

Track Two Systemwide Renovation Program

Additional renovation funding needs beyond what can currently be reasonably forecast to become available are also presented in this CIP, at a conceptual planning level. The Track Two renovation program comprises projects which would be highly desirable to accomplish within the next ten years, but which are not at this time considered essential to reliable operation of future service levels within that timeframe. The Track Two renovation program is estimated at nearly \$566 million, including the newly listed C-1 car renovation.

System Extension Program

From the earliest days of its planning, the BART system has been envisioned by many as an expansive network of lines which ultimately would link most of the counties in the greater San Francisco Bay Area region. Limitations on funding restricted the original construction to 72 miles of double track in San Francisco, Alameda, and Contra Costa counties. But plans for extension of the original system continued to be considered throughout the 1970's and early 1980's.

In the mid-1980's several Bay Area counties began to explore the possibility of funding various transportation improvements, including BART extensions, through increases in

sales taxes. BART was granted significant funding from sales taxes in Alameda and Contra Costa counties, and from state and other sources, for extensions in those two counties. In Contra Costa County, an extension from the former end of the line at Concord now continues to new stations at North Concord-Martinez and Pittsburg Baypoint. In Alameda County, the new branch line from Bayfair Station to Castro Valley and Dublin-Pleasanton was built. Federal grants were simultaneously secured for an extension to Colma Station in San Mateo County. All of these projects have entered service in the last two years.

San Francisco International Airport Extension

The next major planned extension of the BART rail system is from the new Colma Station to San Francisco International Airport. The funding plan for this \$1.167 billion project is currently in negotiation with various agencies, and includes the following major elements: \$750 million in federal Section 3 funds; state funds totaling \$108 million; \$10 million in regional bridge tolls; \$200 million from the Airport; and \$99 million from San Mateo County. In addition, the District will provide a \$72 million Capital Reserve Account (CAPRA) for potential grant ineligible expenses associated with the project. The CAPRA will be generated through \$7.5 million in direct allocations from operating sources to be made in FY 1998 and FY 2000, and a dedicated bond issue of \$64.5 million planned for FY 2001.

Warm Springs Extension

This planned \$702.4 million extension, as reflected in this CIP, would extend in an aerial alignment from the current end of line at Fremont Station to two new stations at Irvington and Warm Springs in southern Alameda County. This project is listed in the Track One program on the basis of an application made to the Alameda County Transportation Authority (ACTA) for the reauthorization of Alameda County's Measure B. The proposed funding plan includes \$297.7 million from a reauthorized Measure B and \$404.7 from state sources, bridge tolls, and San Mateo County.

Oakland Airport Connector

This planned \$198.6 million extension would extend in an aerial alignment from the existing Oakland Airport/Coliseum Station to Oakland Airport, in Alameda County. This project is listed in the Track One program on the basis of an application made to ACTA for the reauthorization of Alameda County's Measure B. The proposed funding plan includes \$120 million from a reauthorized Measure B and \$78.6 from federal and state sources, future bridge tolls, and the Port of Oakland.

West Dublin-Pleasanton Station

This planned \$39.4 million project would build the third station originally planned for the Castro Valley-Dublin/Pleasanton Extension, in Alameda County. This project is listed in the Track One program on the basis of an application made to ACTA for the reauthorization of Alameda County's Measure B. The proposed funding plan includes

\$35.1 million from a reauthorized Measure B and \$4.3 from state sources, future bridge tolls and other sources.

Pittsburg-Railroad Avenue Station

This planned \$200.1 million project would extend the new Pittsburg-Baypoint segment further east in Contra Costa County, to a new station at Railroad Avenue. A portion of this project is listed in the Track One program on the basis of remaining funds from the initial Measure C along with other funding sources. BART will continue to seek funding for the balance of the project, which continues to be listed in Track Two.

Seismic Retrofit Program

A portion of BART's planned Seismic Retrofit Program is newly included in Track One on the basis of an application to ACTA for the reauthorization of Alameda County's Measure B. Approximately 71 percent of BART's aerial structures are located in Alameda County. Alameda County's pro-rated share (\$154.5 million) of the cost to bring all aerial structures up to the latest seismic design standards has been submitted to the Measure B process. BART will continue to seek funding from other sources for the balance of this program, which continues in Track Two.

Service Improvements

BART and AC Transit have entered into a Memorandum of Understanding through which AC Transit will pass to BART \$12.2 million in federal funds and local match for construction of intermodal transit center improvements at eight stations. The Bay Area Air Quality Management District is providing funds for the \$704,000 program to improve the quality of bicycle access to BART stations. BART funds are programmed to implement the \$580,000 Anti-Graffiti Program, expansion of Concord Shop maintenance facilities (\$14.3 million) and the initial phase of similar expansion of the Hayward Shop facilities (\$8 million).

Research, Development and Demonstration

BART continues to work in various R&D areas with prior grant funds, including Electric Station Cars and Superconducting Magnetic Energy Storage. Prior allocation of BART funds are being used to study possible advances in Adaptive Diagnostic Systems for improved transit vehicle reliability and faster, more efficient vehicle maintenance. BART will continue to seek grant funding for technological advances from specialized sources for which basic system renovation and expansion are not eligible.

Chapter 3

PROJECT LISTINGS: FUNDING NEEDS AND PRIORITIES

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I. SYSTEMWIDE RENOVATION PROGRAM

I-A. Rolling Stock Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002
A- and B-car renovation *	454,400	286,825	167,575	0	152,784	3,698	3,698	3,698
Other rolling stock renovation projects								
c Wheel upgrade program	2,000	2,000	0					
Replace electrical couplers on C-1 cars	2,200	2,200	0					
Replace batteries on A, B and C-1 cars	1,900	1,900	0					
Replace A- and B-car door components	4,688	4,688	0					
Install automatic train control restoration units	700	0	700					
Subtotal	11,488	10,788	700	0	0	0	0	0
* "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$15,000,000 in CMAQ, \$1,973,500 in TCI, \$15,000,000 in Prop. 108 bonds, \$12,000,000 in bridge tolls, and \$3,378,600 in BART funds.								
Total Track One	465,888	297,613	168,275	0	152,784	3,698	3,698	4,397

I-A. Rolling Stock Renovation (Track Two)			
		Total Cost	Funding to 6/30/97
Priority 2			
Install automatic train control restoration units (additional)		1,700	0
C-1 car renovation		265,000	0
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two		266,700	0
Category Total (both tracks)		732,588	297,613
			434,975

NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-B. Mainline Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment			
				1998	1999	2000	2001
c Recoat steel tunnel liner rings	786	786	0				
c Replace BHT fan controller	N/A	N/A	N/A				
c BHT fire protection mods	2,245	2,245	0				
Replace running rail & accessories	30,580	5,510	25,070	2,937	3,061	1,744	4,419
Rehabilitate subway ventilation fans	1,337	1,337	0				
Repaint structural girders & bridges for corrosion protection	1,812	1,812	0				
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200				
Replace sump pumps in subway tunnels	3,300	3,300	0				
Replace dry with wet standpipes	10,200	10,200	0				
Asbestos abatement 1, 2, 3	1,644	1,644	0				
Asbestos abatement 4	5,500	1,709	3,791	2,500	1,291		
Rehab traction power equipment	33,514	802	32,712	10,000		120	
Replace traction power house roofs	420	90	330	100	110		
Track embankment upgrade	243	243	0				
Replace R-O-W fencing and barbed wire	930	350	580		85	90	95
Caltrans reimbursable projects	3,097	3,097	0				
Repair Lake Merritt Channel subway structure	1,860	0	1,860	100	1,100	660	
Emergency mainline repairs	3,346	0	3,346	300	309	318	327
Replace surfaces at maintenance set-on points	765	0	765		180	190	195
Widen I-80 overcrossing per Caltrans	N/A	N/A	N/A				
Total Track One	106,103	36,449	69,654	15,937	6,136	3,122	5,036
							1,100
							38,323

I-B. Mainline Renovation (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Rehab traction power equipment (additional)	35,000	0	35,000
Priority 3			
Repair structure damage in S.F. approach tunnel	1,000	0	1,000
TBT vents automatic power transfer	2,565	0	2,565
Replace TBT lower gallery lighting fixtures	180	0	180
Additional blue light safety stations	155	0	155
Remove gaps in handrail along emergency walkways	285	0	285
Remove obstructions on emergency walkways	360	0	360
TBT fan and damper control improvements	410	0	410
Additional electrical insulation at various locations	160	0	160
Motorize fire main valves in BHT	240	0	240
Replace traction power control batteries	300	0	300
Subtotal	5,655	0	5,655
Priority 4			
Dry standpipes at I-680 and Springbrook crossings	370	0	370
Tunnel hose valve plan	160	0	160
Relocate crossover at C53	7,650	0	7,650
Subtotal	8,180	0	8,180
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	48,835	0	48,835

Category Total (both tracks)	154,938	36,449	118,489
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-C. Stations Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment			
				1998	1999	2000	2001
c Replace four Embarcadero Station escalators	2,867	2,867	0				
c Replace fire mains at three stations	250	250	0				
c Cubic faregates modifications	777	777	0				
c Replace floors on ten elevators	510	510	0				
c Repair concrete roof of Lake Merritt Station	356	356	0				
c Replace and add bicycle lockers	596	596	0				
c Replace station fire alarms	350	350	0				
Automatic Fare Collection modernization	54,000	4,572	49,428	28,428	17,500	200	3,300
Interim AFC upgrades	2,320	2,320	0				
Replace AFC air dryers	N/A	N/A	N/A				
Agent ticket reader	330	330	0				
Credit-debit vendors	4,009	4,009	0				
Station security program	4,417	4,417	0				
Replace 19 station escalators	12,821	12,821	0				
Renovate escalators systemwide	25,640	25,640	0				
Renovate elevators systemwide	6,771	0	6,771	4,723	304	244	1,500
Replace station signage	1,485	1,485	0				
Replace platform edge tile	1,587	1,587	0				
Repair stair tread edges and replace anti-slip treatments (ADA) Key Station	551	551	0				
ADA informational signage	452	452	0				
Key Station (ADA) 12th Street elevator replacement	470	470	0				
Key Station (ADA) accessible parking improvements	900	900	0				
Replace sewage pumps in underground stations	480	480	0				
Repair platform sub-surface at six stations	470	470	0				
Remove architectural barriers for accessibility	467	467	0				
"Mint Station" program	455	455	0				
Modify change machines	34,243	10,026	24,217	3,285	3,129		17,803
Replace roofing on stations	925	925	0				
Add faregates from storage at various stations	2,942	802	2,140	920		342	878
Replace bus transfer ticket machines	1,064	1,064	0				
Replace security gates at some stations	922	922	0				
MacArthur Station emergency egress improvements	327	327	0				
Energy conservation (Embarc., Lake Merritt, Hayward Shop)	150	150	0				
Energy conservation systemwide	1,862	1,862	0				
Replace intel structures on W. Oakland platforms	21,190	0	21,190			2,000	15,190
Replace P.A. systems at all stations	1,000	0	1,000			2,000	1,000
Emergency stations repairs	850	0	850			503	850
	5,138	0	5,138	475	489	519	2,618
Total Track One	193,944	83,210	110,734	37,831	21,422	2,947	2,876

I-C. Stations Renovation (Track Two)		
	Total Cost	Funding to 6/30/97
Priority 2		
AFC expansion	20,000	0
Interim AFC upgrades (additional)	2,080	0
Various egress improvements (additional)	230	0
Mint Stations (additional)	18,025	0
Refurbish station agents' consoles systemwide	5,300	0
Subtotal	45,635	0
Priority 3		
Replace station parking lot signs	305	0
Resurface parking lots at stations as needed	2,910	0
Replace ceiling in No. Berkeley Station	1,070	0
Subtotal	4,285	0
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>		
Total Track Two	49,920	0

Category Total (both tracks)	243,864	83,210	160,654
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-D. Controls & Communications Renovation (Track One)									
	Total Cost	Funding to 6/30/97	Funding Req't.	1998	1999	2000	2001	2002	2003-08
c Emergency control center back-up	29	29	0						
c Replace Maint. Vehicle Detection Devices *	373	373	0						
c Reverse running in Transbay Tube	130	130	0						
Next generation control system *	19,226	19,226	0						
Fiber optic/radio network (TRACS)* ***	60,000	0	60,000	60,000					
Advanced automatic train control R&D phase	43,200	33,800	9,400	4,700	4,700				
AATC implementation **	52,000	0	52,000	26,000	26,000				
Replace workstation consoles in Central *	746	746	0						
Rehab train control equipment	38,443	1,883	36,560	8,500	2,000	1,643			24,417
Replace Metro/Vision destination signs	1,300	1,300	0						
Portable radios for station agents and maintenance pers.	N/A	N/A	N/A						
Comspec position in Central	265	195	70	70					
Replace MARIS (MIS) software	1,615	1,615	0						
Cash handling improvements	1,207	1,207	0						
Train ID enhancement	1,472	1,472	0						
Yard train control improvements	1,937	1,937	0						
MIS mainframe computer	600	600	0						4,000
Replace Digital Transmission System	4,000	0	4,000						550
Replace yard cable plant	550	0	550						4,179
Emergency controls and communications repairs	8,292	0	8,292	775	798	822	846	872	480
Replace cable plant (excl. T1) systemwide	480	0	480						130
Replace wayside cable plant splice boxes syswide	130	0	130						
* Does not include portions funded in extensions budgets.									
** Preliminary estimate--actual cost to be determined based on funding strategy: if AATC is not implemented, then conventional resignaling needed on A-line.									
*** These projects are included as parts of the fiber optic/radio network.									
Total Track One		235,995	64,513	171,482	74,045	33,498	28,465	846	872
									33,756

* Does not include portions funded in extensions budgets.

** Preliminary estimate--actual cost to be determined based on funding strategy; if

AATC is not implemented, then conventional resigaling needed on A-line.

*** These projects are included as parts of the fiber optic/radio network.

J-D. Controls & Communications Renovation (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Rehab train control equipment (additional)	35,000	0	35,000
Replace non-MetroVision destination signs	5,000	0	5,000
Subtotal	40,000	0	40,000
Priority 3			
Yard lower data network	670	0	670
Replace yard voice recorders	260	0	260
Replace CATV and CCTV systemwide	310	0	310
Subtotal	1,240	0	1,240
Priority 4			
Replace T1 cable systemwide ***	N/A	N/A	N/A
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	41,240	0	41,240

Category Total (both tracks)	277,235	64,513	212,722
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-E. Facility Renovation and Replacement (Track One)

	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment			
				1998	1999	2000	2001
c Replace Hayward wheel press	673	673	0				
c Richmond oil/water separator tanks	197	197	0				
c Wheel/rail maintenance study	300	300	0				
c Wheel truing machines	3,616	3,616	0				
Non-stock inventory (reparable parts provisioning)	30,412	2,412	28,000	1,800	1,900	2,000	2,200
Hayward Shop traction motor repair facility reconfiguration	1,995	1,995	0				
Replace dust collector systems at Richmond & Concord	1,247	1,247	0				
Central receiving/distribution warehouse facility (study)	400	400	0				
Employee facility improvements	2,212	212	2,000	1,566	434		
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000	1,000			
Reconfigure transportation buildings	2,295	2,295	0				
Transfer track crossings	360	360	0				
Yard fuel tanks	23	23	0				
Metro bldg. fuel tank	189	189	0				
1000 volt power supplies	63	63	0				
Rich. Yard efficiency modifications	353	353	0				
Richmond Shop & Yard security improvement	1,067	1,067	0				
Replace Hayward Shop fire main	235	235	0				
Hayward test track security improvement	108	108	0				
Replace purchasing & inventory control system	570	0	570				570
Replace parts washing facilities in all shops	330	50	280				
Emergency shop repairs	1,862	0	1,862	170	175	180	185
Replace roofing on shops, towers, etc.	3,600	0	3,600		400		
Total Track One	53,645	16,333	37,312	4,536	3,189	2,180	2,591
							22,431

I.E. Facility Renovation and Replacement (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Lake Merritt Building renovation	7,000	0	7,000
New administrative headquarters building	60,000	0	60,000
Subtotal	67,000	0	67,000
Priority 3			
Recondition shop sump pumps (Rich, Conc, Oak)	260	0	260
Second wheel/axle press (location TBD)	1,550	0	1,550
Rehabilitate and reconfigure Oakland Shop	75,160	0	75,160
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225
Paint and repair facility	2,000	0	2,000
Train operator training simulator	1,000	0	1,000
Additional tracks at Hayward Yard	100	0	100
Central receiving/distribution warehouse facility (impl.)	6,000	0	6,000
Subtotal	87,295	0	87,295
Priority 4			
Replace shop roll-up doors (Rich, Hay, Conc, Oak)	1,250	0	1,250
Replace shop radiant heaters	200	0	200
Resurface roads/parking and ramp shop/yard exterior light	310	0	310
Replace grease/oil facilities (Hay, Rich, Conc, DC)	160	0	160
Repaint shop floors	515	0	515
Replace yard disconnect enclosures	620	0	620
Corrosion protection isolation of yard traction power	3,200	0	3,200
Storage area canopy, lighting and office at Richmond Shop	180	0	180
Subtotal	6,435	0	6,435
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	160,730	0	160,730

Category Total (both tracks)	214,375	16,333	198,042
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

■ shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-F. Work Equipment (Track One)		Fiscal Year Commitment						
Total Cost	Funding to 6/30/97	Funding Req't.	1998	1999	2000	2001	2002	2003-08
4,303	987	3,316	400	400	400	300	0	1,816
7,536	1,496	6,040	860	500	500	350	0	3,830
14,000	1,684	12,316	1,605	1,200	1,200	600	0	7,711
8,450	1,891	6,559	945	600	600	414	0	4,000
143	143	0	0	0	0	0	0	0
34,432	6,201	28,231	3,810	2,700	2,700	1,664	0	17,357
Total Track One								

I-F. Work Equipment (Track Two)			
Priority 3	Total Cost	Funding to 6/30/97	Funding Req't.
Miscellaneous	4,130	0	4,130
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	4,130	0	4,130

Category Total (both tracks)	38,562	6,201	32,361
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98
c indicates completed project
All figures in thousands of dollars (three decimals places dropped).

III. Extensions (Track One)		Total Cost	Funding to 6/30/97	Funding Req'd	Fiscal Year Commitment				
					1998	1999	2000	2001	2002 2003-08
c	to Colma (1)	170,179	170,179	0					
c	to Dublin-Pleasanton (1)	543,050	543,050	0					
c	to Pittsburg-Bay Point (1)	505,740	505,740	0					
	to San Francisco Airport (2)	1,167,000	79,811	1,087,189	1,087,189		2,850	64,500	
	SFO CAPRA (3)	72,000	0	72,000	4,850				
	Power substations for SFO	12,500	0	12,500	12,500				
	to Warm Springs (4)	702,430	55,400	647,030		7,000	17,000	14,000	592,030
	West Dublin/Pleasanton station (4)	39,370	0	39,370					39,370
	Oakland Airport Connector (4)	198,590	0	198,590		3,000	8,000		187,590
	Pittsburg-Bay Point to Railroad Ave. (5)	96,000	96,000	0					
	Extension planning	4,002	4,002	TBD					
Total Track One		3,510,861	1,454,182	2,056,679	1,104,339	10,000	27,850	81,500	14,000 818,990

- 1 "Total Cost" shown is programmed funding. Actual final cost to be determined upon financial close-out of projects.
- 2 Estimated cost of proposed project in current Locally Preferred Alternative; proposed funding plan includes \$750M total from FTA (\$55M has been appropriated to date), \$99M total from the recently executed Amendment to the BART-Sam Trans Agreement (\$9.25M has been appropriated to date), \$108M total in state funds (\$14.56M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$1M received to date) and \$200M from the S.F. Airport itself
- 3 Capital Reserve Account for grant-ineligible expenses of S.F. Airport Extension.
- 4 Projects submitted for consideration in Alameda County Measure B re-authorization process.
- 5 Track One portion of project, for which funding can reasonably be forecast. See additional increment in Track Two below.

II. Extensions (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req'd.
Priority 2			
Pittsburg-Bay Point to Railroad Ave. (6)	104,100	0	104,100
Power substation for DPX	3,800	0	3,800
Phase 2 and 3 Extensions			
to Antioch	TBD	0	TBD
through West Contra Costa			
to Livermore			
within San Francisco			
through San Ramon Valley Corridor			
to Santa Clara County			
Commuter Rail (7)			
Subtotal	TBD	0	TBD
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	107,900	0	107,900

⁶ Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

⁷ BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State recently approved BART management of the Capitol Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.

Category Total (both tracks)	3,618,761	1,454,182	2,164,579
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

■ shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

III. Seismic Retrofit Program (Track One)									
	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment					
				1998	1999	2000	2001	2002	
Support of Caltrans seismic work (reimbursable)	2,258	2,258	TBD						
Seismic retrofit of aerial structures *	154,543	0	154,543						154,543
* This element is for retrofit of aerial structures in Alameda County (71% of total aerial mileage), which is under consideration for Measure B re-authorization funding. See also Track Two program below for balance of aerial retrofit program.									
Total Track One	156,801	2,258	154,543	0	0	0	0	0	154,543

III. Seismic Retrofit Program (Track Two)			
Priority 2	Total Cost	Funding to 6/30/97	Funding Req't.
Seismic rack anchors & vehicle support tiedowns	400	0	400
Seismic restraints on overhead cranes	200	0	200
Engine-generators for earthquake standby power #1	4,500	0	4,500
Engine-generators for earthquake standby power #2	2,160	0	2,160
Seismic structural evaluation of aerial structures	1,145	0	1,145
Seismic retrofit of aerial structures	63,907	0	63,907
Seismic sensing system upgrade	2,500	0	2,500
Gas valve automatic seismic shut-offs	170	0	170
Retrofit Transbay Tube seismic joints	620	0	620
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	75,602	0	75,602

Category Total (both tracks)	232,403	2,258	230,145
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

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shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

IV. Service Improvements (Track One)		Fiscal Year Commitment								
		Total Cost	Funding to 6/30/97	Funding Req't.	1998	1999	2000	2001	2002	2003-08
c	BayFair transit center	1,007	1,007	0						
c	Concord transit center	2,178	2,178	0						
c	Walnut Creek transit center	2,930	2,930	0						
c	Daly City transit center	7,100	7,100	0						
	Expand Concord Shop	14,442	192	14,250	1,800	11,863				587
	Initial expansion of Hayward Shop	8,000	0	8,000						8,000
	Anti-graffiti program	580	580	0						
	Bicycle access improvements	704	704	0						
	Pathfinder sign program prototype	230	230	0						
	Hayward transit center	2,530	2,182	348	348					
	Pittsburg park/ride	1,761	1,761	0						
	Ashby Station parking redesign	288	288	0						
	System Capacity Study	150	150	0						
	Pl. Hill park/ride for I-680/24 mitigation	689	689	0						
	El Cerrito Plaza transit center (AC Transit funding)	260	260	0						
	Richmond transit center (AC Transit funding)	1,418	1,418	0						
	Fremont transit center (AC Transit funding)	2,707	2,707	0						
	Fruitvale transit center (AC Transit funding)	2,880	2,880	0						
	South Hayward transit center (AC Transit funding)	1,223	1,223	0						
	Coliseum transit center (AC Transit funding)	875	875	0						
	Union City transit center (AC Transit funding)	2,533	2,533	0						
	System access planning	150	150	TBD						
	Station area development planning	1,019	1,019	TBD						
	West Oakland transit center (AC Transit funding)	349	349	0						
	El Cerrito Plaza access and station area improvements	5,500	5,500	0						
Total Track One		61,503	38,905	22,598	2,148	11,863	0	0	0	8,587

IV. Service Improvements (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
A-line traction power enhancements	21,200	0	21,200
M-line traction power enhancements	47,550	0	47,550
C-line traction power enhancements	6,500	0	6,500
R-line traction power enhancements	22,500	0	22,500
Subtotal	97,750	0	97,750
Priority 3			
West Oakland access and station area improvements	TBD	0	TBD
Fruitvale access and station area improvements	TBD	0	TBD
Union City access and station area improvements	TBD	0	TBD
Rockridge access and station area improvements	TBD	0	TBD
Additional Capacity Enhancement Program *	2,000,000	0	2,000,000
Subtotal	2,000,000	0	2,000,000
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	2,097,750	0	2,097,750
* Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities; in order to support an increase in daily patronage from 369,000 daily under the currently projected growth plan, to 500,000 daily under and "Additional Capacity Enhancement" program.			

Category Total (both tracks)	2,159,253	38,905	2,120,348
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

V. Research, Development and Demonstration (Track One)	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002 2003-08
Electric Station Cars demonstration	1,440	1,440	0					
Electric vehicle charging kiosk demonstration	1,100	1,100	0					
Superconducting Magnetic Energy Storage	350	350	0					
Adaptive diagnostic systems	123	123	0					
Sound mitigation/noise reduction program	350	350	0					
R&D program	762	762	TBD					
Total Track One	4,125	4,125	0	0	0	0	0	0

V. Research, Development and Demonstration (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Sound mitigation/noise reduction program (additional)	TBD	0	TBD
Adaptive diagnostic systems (additional)	3,741	0	3,741
Superconducting Magnetic Energy Storage (additional)	669	0	669
Traction power optimization	TBD	0	TBD
Other	TBD	0	TBD
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	4,410	0	4,410

Category Total (both tracks)	8,535	4,125	4,410
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

■ shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

VI. Other Financial Obligations (Track One)									
	Total Cost	Funding to 6/30/97	Funding Req'd	Fiscal Year Commitment					
				1998	1999	2000	2001	2002	
Other financial obligations (C-2 car bonds, A/B float cars, MetCenter reserve, Daly City reserve, project development)	96,439	1,309	95,130	94,410	80	80	80	80	400
Total Track One	96,439	1,309	95,130	94,410	80	80	80	80	400

VI. Other Financial Obligations (Track Two)			
Priority 2	Total Cost	Funding to date	Funding Req't.
	0	0	0
Total Track Two			
Category Total (both tracks)		96,439	1,309
			95,130

NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

Chapter 4

PROJECT DESCRIPTIONS

System Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful life of the various components of the physical plant.

Rolling Stock Renovation

A- and B-car Renovation

The renovation of the District's original fleet of A- and B-cars is essential to enable BART to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. The A- and B-cars will be 25 years old prior to renovation and have never been overhauled. The renovation will replace worn out and obsolete components and return the vehicles to their original design specifications. Systems to be replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of new car cost.

Replace Electrical Couplers on C-1 Cars

The existing "pin-type" inter-car electrical couplers on BART cars are very high maintenance items. Conversion to "button-type" couplers will reduce maintenance requirements and car out-of-service time.

Replace A- and B-car Door Components

Malfunctions of the door systems on A- and B-cars is a major factor in service disruptions, and as such is being addressed earlier than can be accomplished through the whole-car renovation program. One problem is expansion of the foam comprising the door core, which then delaminates the door structures and causes jams. Another problem is corroded door suspension rails are also contributing to door failures.

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically increase the speed with which recovery from such failures can be accomplished, thereby putting temporarily disabled on-line trains back in service much faster. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

Mainline Renovation

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline which have deteriorated, or will in the next ten years, due to age and use. Many components of the trackway and traction power systems are over 25 years old, are failing with increased frequency and must be reconditioned or replaced. Mainline renovation will prevent rail and traction power failures which would cause disruption and delays to revenue service. The Mainline Renovation projects include:

Recoat Tunnel Liner Rings for Corrosion Protection

The steel rings that line BART tunnels periodically have to undergo heavy maintenance periodically, including removal of corrosion encrustation, sandblasting, and application of corrosion-resistant coating. This essential work was done recently to avoid further corrosion and consequent structural deterioration and weakness.

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require changeout on a three- to five-year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency evacuation and for maintenance crews working in subway sections. In the past, failures of fans have been experienced due to cracks that developed in the blades, causing the blades to fail. An engineering analysis was made of all ventilation fans throughout the system, which determined that the blades require replacement.

Recoat Structural Girders and Bridges for Corrosion Protection

The BART aerial structural girders and bridges are now undergoing their first complete rehabilitative repainting since their construction in the 1960's and early 1970's. This work is essential to avoid corrosion and consequent structural deterioration and weakness.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes which attract and consume the corrosive elements. These anodes must be replaced on a cycle of about every ten years.

Replace Sump Pumps in Subway Tunnels

The sump pumps which keep BART subway tunnels dry are 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keeping the system safe and reliable.

Replace Dry with Wet Standpipes

This nearly complete project is replacing dry standpipes with wet (water-filled) standpipes for improved fire-fighting capability.

Asbestos Abatement

The 1989 Loma Prieta earthquake disrupted asbestos insulation in train control electronics rooms at various locations around the District. These rooms can now be entered by maintenance personnel only when they are fully protected against potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive.

Traction Power Renovation

This is a long-term program to rehabilitate a wide range of traction power components and subsystems as these items continue to age and deteriorate, leading to lower reliability and higher potential for service disruption. Individual items will include reconditioning of rectifiers and replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, cabling, switch enclosures, and gas-pressure pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system have been identified as being in critical need of repair. The roofs are constructed of steel decking and in some cases, are rusting through. Water incursion into substations can result in traction power failures and serious service disruption.

Track Embankment Upgrade

This project will correct and upgrade a faulty, eroding track embankment situation between Union City and Fremont Stations.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or due to vandalism. This is a critical safety item.

Stations Renovation

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. Stations Renovation projects include:

Replace Automatic Fare Collection Equipment

The Automatic Fare Equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore is difficult and costly to maintain. The project, as currently defined at a cost of \$54-\$65 million depending on the implementation plan yet to be selected, will replace all ticket vendors, addfares and Cubic faregates, and recondition the IBM faregates. The project needs to be done in order to: decrease revenue collection and maintenance costs through use of more modern servicing modules; increase revenue security and accountability through use of sealed coin and bill units; implement an upgraded Data Acquisition System; and increase equipment availability for customers through greater reliability and maintainability. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as existing equipment approaches the end of its useful service life. To the extent that the regional multi-operator Translink "universal" ticket program is integrated with BART fare equipment, there is additional rationale for a reliable, modern AFC system.

Accessible AFC Equipment (ADA compliance)

This project will bring the BART Automatic Fare Equipment system into compliance with ADA requirements. This will include provision of automated voice guidance in fare-card vending machines and gate improvements to facilitate wheelchair access.

Credit-Debit Vendors

This project is providing new fare-card vending equipment in a number of high volume stations to permit the sale of high value fare-cards with both credit and debit bank cards.

Station Security Program

This project is increasing the illumination levels of surface parking lots, adding emergency police call boxes in parking lots, and providing decentralized satellite station structures to accommodate community-based deployment of BART police forces.

Replace and Rehabilitate Escalators and Elevators

Other than at Embarcadero Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads, particularly in the various downtown subway stations. After 25 years of use and wear-and-tear, they are becoming unreliable, a major source of patron dissatisfaction and uneconomical to maintain and repair on a routine basis. Several of the most

unreliable escalators will be replaced, and all of the other escalators and elevators will be completely reconditioned.

Replace Maps and Signs in Stations

This project is updating and replacing outdated maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project is providing a graphic display system that is more flexible and more easily updated than the old maps, which had not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations and are delaminating from the platforms as well. They need to be replaced to remain safe, functional, and in compliance with ADA.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment must be renewed in order to protect the safety of those who use the stairs, especially during wet weather.

Key Station (ADA) Accessibility Improvements

These projects are providing federally mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for accessible car and van parking. These projects are needed to comply with ADA requirements and to improve passenger comfort and convenience.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the BART system opened 25 years ago. They are becoming increasingly unreliable and uneconomic to maintain. These pumps must be functional as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to begin to lift and create potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. It is necessary to reconstruct the sub-surfaces to allow a stronger bond for the tiles.

Repair Concrete Roof of Lake Merritt Station

This project repaired the structurally deteriorated concrete roof and replaced waterproofing over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof caused water leakage in the south stairway area making it necessary to close that stairway whenever it rained. Implementation of this repair work restored the structural integrity of the concrete roof and provides safe and uninterrupted patron access between mezzanine and platform levels.

"Mint Stations" Program

This is a multi-year program to improve the passenger experience in the BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted, and retiled as necessary. Weather-protection canopies and windbreaks are being renovated as needed. Repairs are being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Modify Change Machines

The change-making machines throughout the BART system are being retrofitted to provide better reliability and improved cash collection efficiency.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards, protect equipment and furnishings, and avoid structural damage, roofing must be replaced on a periodic basis.

Refurbish and Install In-Storage Faregate Units

The District has drawn 30 faregate units from long-term storage, which are being refurbished and installed at various locations where exit faregate queuing problems occur.

Replace Bike Lockers

The original bicycle storage lockers at stations had deteriorated to the point of not providing an acceptable level of security and weather protection, and have been replaced.

Replace Bus Transfer Ticket Machines

The machines in BART stations which issue transfer tickets are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus service. These machines are being replaced.

Energy Conservation Lighting Retrofit in Stations

The 25-year-old lighting systems in most BART stations consume far more electricity than equivalent modern systems. This project is replacing those outdated systems with new equipment which will generate substantial energy conservation and consequently significant operating savings.

Replace Lintel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts and lintels which are cracking and deteriorating due to vibration. This project would replace those lintels with a different type of structure less susceptible to vibration damage.

Replace/ Recondition Station Public Address Systems

This project would recondition or replace, as warranted, public address systems at those stations where the volume and/or voice quality of the existing installation has deteriorated to the point of not being able to provide an acceptable level of information to patrons.

Refurbish Station Agent Consoles

The electronics in the station agent consoles are still the original installations. Most of these electronics are obsolete and are no longer supported by manufacturers, making the maintenance of these increasingly unreliable units time-consuming and excessively expensive.

Controls & Communications Renovation

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. Controls & Communications Renovation projects include:

Replace Maintenance Vehicle Detection Devices

This project replaced the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These essential vehicle detection devices allow Central Control to observe the location of on-track maintenance vehicles, and serve as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The new units replaced those which had been in service over 24 years, with increasingly higher failure rates. When a failure occurred, the high-rail maintenance vehicle had to be removed from the mainline track, per PUC requirements, resulting in non-productive time in maintenance work schedules and the need for single tracking.

Reverse Running In Transbay Tube

In the past, the train control electronics restricted reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification to the train control electronics is providing the necessary signaling to allow up to three trains simultaneously in the Tube.

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems included in this budget are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project is needed to replace the 25-year-old computers running the DAS and DSS systems and the 15-year-old CCS computers.

Fiber Optic/ Radio Telecommunications Network

This project is furnishing and installing a systemwide fiber-optic and multi-frequency trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The current radio system has several significant shortcomings, both in terms of capacity and reliability, which have frequent negative operational impacts and occasionally affect safety. This project is being implemented through an innovative joint development program, with significant long-term revenue potential.

Advanced Automatic Train Control

This project is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project will allow system throughput to increase from the current 17 trains per hour up to 30 trains per hour. The system will be one which can be installed over the existing control equipment with relative ease and no service disruptions. The project will help BART to meet the increased demands on the system as headway reductions become necessary in the future, as well as displace significant needs for train control renovation.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Train Control Renovation

This is a long-term program to replace vital train control components and subsystems which are becoming unreliable due to age and difficult to maintain due to obsolescence. Most of these components are no longer being produced and are no longer supported by manufacturers. If this work is not completed in a timely manner, essential train control hardware failures will lead to extensive disruption of service. This

program will also replace the Sequential Occupancy Release System, (SORS). SORS is a Public Utilities Commission required back-up safety system to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the vital train control system. The primary SORS computer is 25 years old, is obsolete, and becoming difficult to maintain. This safety-critical system must remain operational and reliable.

Second Communications Specialist Position In Central Control

As the extensions become operational and the number of trains on-line increases, it is necessary to have a second position from which BART communications specialists can make essential announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MARIS

This project is replacing the District's 25-year-old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Replace MetroVision Sign Units

This project will replace the MetroVision sign units in the downtown San Francisco and Oakland stations. These units, which display train destination and general BART information, along with commercial advertising and public service messages, will be removed upon expiration of the current MetroVision contract. They will be replaced with the same type of updated dot-matrix sign units now being used in the new extension stations.

Replace Yard Voice Recorders

Located in each train storage and dispatch yard are multi-channel voice recorders which record all communications regarding train movements. This information can be critical in determining exactly what occurred in the event of any sort of accident involving trains in the yards. The existing units are becoming unreliable and hard to maintain.

Facility Renovation and Replacement

The purpose of this program of projects is to address the deterioration of the shops and yards due to 25 years of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. These projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance, and by reducing vehicle out-of-service time and keeping as many vehicles in service as possible, thereby reducing train crowding; make the shops and yards safer places in which to work; provide cost savings to the District by reducing maintenance turn-around time and eliminating travel time to and from vendors; and

improve the efficiency of the shops and yards by providing employees with dependable equipment needed to perform their duties effectively. Shops & Yards Renovation projects include:

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all high-value repairable parts in support of all transit vehicles, station and field equipment, and AFC equipment. Failure to provide for these requirements could lead to vehicles out-of-service and potential disruption to normal maintenance and service operations. This on-going need must be funded annually.

Wheel Truing Machines

This project replaced a 25-year-old wheel truing machine in the Hayward Shop. A new, second wheel truing machine was also installed at the Richmond Shop. The new, more reliable and higher capacity truing machines allow the District to go to a higher standard of preventive maintenance for wheel profiles, which result in increased productivity and lower load factors since fewer cars are being held out-of-service waiting for wheel re-profiling.

Hayward Shop Traction Motor Repair Facility

This project will renovate the shop and replace maintenance equipment to support BART's aging fleet. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars will be held out of service for repairs in the future.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow-pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants, and provides renovation of shop heating and cooling systems.

Central Receiving and Distribution Warehouse Facility

The District will face increased need for inventory of materials as the new system extensions are coming on-line, as the size of the operating fleet increases, and as parts must be stocked for A- and B-cars as configured both before and after renovation. A new central receiving and distribution warehouse facility would meet those needs.

Employee Facilities Improvements

The infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building have not changed materially since the BART system opened. This project will provide basic essential reconditioning and remodeling as needed to provide acceptable work environments.

Overhaul Transit Vehicle Washers

The facilities used to wash the exterior of transit vehicles are still the original installations. They are becoming increasingly inefficient, and do not comply with current

standards for containment and treatment of chemical-laden waste water. This project will bring the washers back up to original functionality and provide acceptable control of waste.

Reconfigure and Renovate Transportation Buildings

These buildings at the train dispatch yards provide the essential administrative facilities for on-site train operations, as well as lunch/breakrooms, locker rooms, and other support facilities for on-duty train operators. The current configuration of these buildings is inadequate to serve the increased number of operators required to provide higher levels of service associated with the new system extensions. At the same time, the existing structures will be reconditioned and remodeled as necessary, as in the Employee Facilities Improvement project.

Yard Fuel Tanks

This project will install 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement which will eliminate the need to bring maintenance vehicles from these outlying yards all the way into the Oakland Yard, as is now the case, to refuel.

MetroCenter Building Fuel Tank

The 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is no longer in compliance with regulations for underground fuel storage. BART has been ordered by Alameda County to replace the tank.

Yard Efficiency Improvements

This project reconfigured trackwork at the Richmond Shop to improve staging and routing of cars.

Replace Parts-Washing Facilities in All Shops

This project replaces parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities if found not to be in compliance.

Replace Roofing On Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as they deteriorate due to age and exposure.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lifting units must be assured through periodic reconditioning.

Work Equipment

The purpose of this program is to replace worn and obsolete maintenance and service vehicles and maintenance equipment. This equipment includes such items as tools, power generator sets, light towers, grounds and buildings maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police and personnel sedans, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from use. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by rail but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Castro Valley and Dublin/Pleasanton

This project, which opened in May 1997, is a 13.8-mile double-track, new branch line extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project at Dublin-Pleasanton. Currently, there are two stations on this extension: one in Castro Valley located at I-580 and Redwood Road, and a second station in East Dublin-Pleasanton near Hacienda Business Park. A third station at West Dublin-Pleasanton near Stoneridge Mall will be added when funding has been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8-mile double-track extension, having two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements were made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point opened in December 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

San Francisco Airport

The proposed San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at Hickey, Tanforan, and Millbrae. This extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient transportation link between BART and CalTrain and to the West Bay communities.

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District.

Oakland Airport Connector

The Oakland Airport Connector Project will directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project. Other technologies and funding sources are also being evaluated.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with the expected host communities, and will pursue funding for further planning and development of these projects, but funding constraints indicate that their implementation will not be likely within the timeframe of this current capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors faster than the BART system itself can be extended, is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program

could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area.

Seismic Retrofit Program

The purpose of this program of projects is to bring the existing system up to the latest seismic standards to enhance the system's ability to safely endure severe earthquakes and quickly return to service by:

Improving the structural strength of BART's aerial structures and Transbay Tube joints in order to withstand greater seismic forces.

Improving the system of seismic detectors which slows or stops trains in the event of an earthquake.

Installing automatic seismic gas shut-off valves.

Providing engine-generators for the event of a possible PG&E power loss.

Providing restraints for overhead crane structures at maintenance shops.

Providing tie downs for the stands that transit vehicles are supported on during maintenance at the shops.

The structural strengthening components of this project will bring existing structures up to current seismic standards, and improve the ability of the system to withstand major earthquakes with little or no damage. Other components of this project will augment earthquake preparedness systems already in place to provide more coverage, more detailed and accurate information, and to permit faster response to protect the safety of the rail system, its patrons and employees.

Service Improvements Program

Hayward, Bay Fair, Concord, Walnut Creek, and Daly City Transit Centers

All of these projects are now operational. They improve traffic circulation in the vicinity of the stations, and improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities.

Additional Transit Centers

BART and AC Transit have entered into a Memorandum of Understanding in which AC Transit will pass federal section 9 funds through to BART to fund construction of transit centers at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations.

Reconfigure, Renovate & Enlarge Hayward and Concord Shops

The increasing size of the operating fleet requires that the heavy maintenance facilities at these two shops be reconfigured, renovated and expanded in order to increase their efficiency adequate to properly maintain the expanded fleet. These expansions are also essential to reducing the amount of time cars are held out of service for maintenance and repairs.

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate patronage growth to 369,000 daily trips. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate growth to 500,000 daily trips. The Additional Capacity Enhancement subprogram is conceptual and still under development, but it would include additional transit vehicles; additional traction power and train control renovation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities beyond the projects listed separately in this *Capital Improvement Program*. This cost indicated for this item provides a preliminary estimate of what these additional improvements might entail.

West Oakland Access and Station Area Improvements

This still-conceptual project would be constructed in the area near West Oakland Station that is being considered for use by other agencies for the Cypress Corridor freeway replacement and inter-city rail service. The scope, cost and schedule for the project is subject to the results of these various planning activities.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently

cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Research, Development & Demonstration

Superconducting Magnetic Energy Storage (SMES)

Two related projects are intended to study the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains at closer headways to support projected future service levels. Two different approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations) and high temperature superconducting materials.

Electric Station Cars

The District is funded for a demonstration program to purchase 45 electric cars to be used by BART and PG&E employees for access to and egress from stations. The project will demonstrate that with "station cars", transit can provide an all electric door-to-door service that will attract new patronage.



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October 27, 1997

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On October 23, 1997, the BART Board of Directors adopted the District's FY98 Short Range Transit Plan (SRTP) and Capital Improvement Plan (CIP) covering fiscal years 1998 through 2008. These two documents present BART's operating and capital plans for maintaining and expanding service. These final documents supersede the draft SRTP and CIP, dated June 3, 1997.

The SRTP and CIP are required to support BART's applications for grant funding through the Metropolitan Transportation Commission (MTC), and consequently, were developed in conformance with MTC guidelines.

Should you have any questions regarding these documents, or require additional copies, you may direct your correspondence to the persons identified below:

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Thank you for your interest in BART and your continued support of our efforts to improve and expand service throughout the Bay Area.

Sincerely,

Thomas E. Margro
General Manager

Attachments

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516
#64
Y 1998-2008
Adopted

San Francisco Bay Area Rapid Transit District

CAPITAL IMPROVEMENT PROGRAM

*July 1997 Through June 2008
Fiscal Years 1998 - 2008*



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October 23, 1997

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CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1998 - 2008

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration under the Federal Transit Laws, 49 U.S.C. Chapter 53 and passed through the Metropolitan Transportation Commission. This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation, and does not preclude future labor contract negotiations or future BART Board deliberations regarding fares.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

This report was researched and prepared by:

Dale Fousel, Kin Cheung, and Richard Golden

Capital Budgets Division
Department of Capital Development & Control
San Francisco Bay Area Rapid Transit District

Adopted October 23, 1997

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

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Chapter 1

CONTEXT AND ORGANIZATION OF THE PROGRAM

Context of the Program

BART faces significant challenges as it prepares to enter the 21st Century with this *Capital Improvement Program*. The District is preparing to start work on a billion dollar extension to the San Francisco International Airport, while at the same time undertaking an unprecedented program of rehabilitating and upgrading the existing system, and improving system accessibility -- all while maintaining and even improving the level of service provided.

An Aging System: The Systemwide Renovation Program

When BART initiated service in 1972, it was state-of-the-art: the most modern, most automated rail transit system in the world. Now, 25 years later, BART is no longer the same sparkling new system. Recognizing this fact, in 1995 and 1996, BART began a major program of system renovation to ensure that service does not deteriorate in the future.

BART now carries more than twice as many passengers daily than in its early years, patronage is still growing, and the equipment is aging. This combination puts the BART system at risk if the District is not able to continue implementing its renovation program expeditiously. Most of the hardware that comprises the BART rail system will reach the end of its operational lifetime over the next few years unless it is rebuilt, reconditioned, or replaced. Renovation funding requirements are generated from a planned replacement cycle based on useful life. Examples of the aging of the BART system include:

- the typical BART railcar has accumulated over a million miles of travel;
- the doors on a typical car have cycled more than three million times;
- nearly a billion people have been transported in these vehicles, used the farecard vendors, activated the faregates, and ridden the escalators or walked the stairs;
- many of the electronic and computer systems which heralded a new era of rail transit technology a generation ago are now becoming obsolete, and therefore increasingly difficult and expensive to maintain.

This onset of aging makes it essential for BART to rebuild before it experiences the declining spiral of effects that many older rail transit systems have suffered due to their inability to attend to preventative maintenance and renovation in a timely manner. This

is not glamorous, high-visibility work, and it is very expensive. But it is essential, and in the long run ***it is much more cost effective to rehabilitate systems before reaching the point of failure than to try to fix problems after they become obvious.*** This will also avoid future degradation of service and consequent loss of patronage and fare revenue.

BART must not only maintain its current level of service while undergoing both expansion and rebuilding, but also provide even higher levels of service to meet the needs of a growing market. To provide reliability at higher levels of service, this *Capital Improvement Program* reflects the need for major renovation for stations; transit vehicles; train control, power, and communications systems; maintenance facilities; and many other parts of the BART physical plant.

A Growing System: Planned Growth and New Services

BART system patronage is expected to continue to grow in the future, both in terms of real growth on the existing core system and as a result of the opening of additional line segments and stations. Patronage is projected to grow more than 39 percent over the term of this document's planning horizon, from 76.9 million trips in 1997/1998 to 107.0 million trips in 2007/2008. This will require additional facilities and capabilities. While BART invested heavily in increasing its people-carrying capacity over the last ten years, continued growth in patronage will require continued capacity expansion. In order to accommodate forecast growth, this capital program calls for improved facilities for feeder bus access; more reliable escalator, elevator and fare processing equipment; an advanced system of automatic train control to increase the frequency of train service and improve service reliability; and additional maintenance facility capacity.

BART has completed a program of significant expansion of patron parking over the past few years. In the early 1990s, BART added more than 2,300 spaces at existing stations. Although demand for station parking continues to be a significant need, funding is not expected to be available for additional parking expansion in the foreseeable future. Over the next few years BART's station access improvement program will focus on grant-funded "intermodal" bus access projects. These projects, several of which have already been completed, will increase the capacity to handle more feeder buses at the stations, along with providing more comfortable amenities for patrons who transfer to and from buses at BART stations. A major program of improved bicycle access will get underway in the next year. In addition, a highly innovative grant-funded demonstration program involves a test of electric "station cars" as one more possible means of improving connections at both ends of BART rail trips.

Replacement of worn and unreliable escalators, elevators, and deteriorating farecard vending equipment and faregates, along with other station renovation projects

and implementation of better interoperator fare mechanisms, will improve the flow of patrons through the stations, while providing increased customer convenience.

Other projects which will both stimulate and help accommodate patronage growth include new line extensions and stations. The extensions to Colma and North Concord/Martinez both opened in the winter of 1995/1996. The further extension from North Concord/Martinez to Pittsburg/Bay Point opened in December 1996, and the new branch line to Castro Valley and Dublin/Pleasanton opened in May 1997. Substantial progress is being made in the planning, design, and funding of the proposed extension from the new Colma Station to San Francisco International Airport. Construction of that billion dollar project is planned to begin in 1997/98.

The District remains committed to the planned Phase 2 and 3 extensions of BART rail service to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. Anticipated funding limitations during the next ten years will almost certainly push their completion beyond that time frame. As a near-term interim solution, a network of commuter rail service using conventional diesel locomotives and standard passenger railcars could be placed in service in these same extension corridors at much lower costs and within two years of funding approval.

An Accessible System: Americans With Disabilities Act Compliance

The BART system has been hailed as a model of public transit accessibility for persons who are elderly and/or disabled, ever since the system began operation. To this day BART remains one of the most accessible rail systems in the world. But the federal Americans With Disabilities Act (ADA) has set even more comprehensive standards than those currently offered by BART or any other rail transit agency in the world. BART is moving aggressively to implement projects necessary to come into compliance with the new regulations.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized, and an additional category of other financial obligations. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Facilities
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project has been assigned a priority level, independent from its funding availability status. Priorities for each project are outlined in Chapter 3 (Project Listings: Funding Needs and Priorities). Priorities range from a high of 1 to a low of 4, based on law and regulation; or degree of criticality to safety, reliability of service, maintenance operations, operation of the extensions, and service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted, or essential to ensure operation performance of the extensions lines.

- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted, or introduction of technological advancements which significantly improve operational performance or result in significant cost efficiencies.
- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed, District goals will not be achieved.
- 4 Routine replacement of worn or obsolescent equipment or systems, desirable system improvements, or reduced maintenance costs.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the risk to operations, safety, or impact on operating costs.

Funding Availability Status

This *Capital Improvement Program (CIP)* lists all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$7.8 billion. A program of this size is currently beyond the level of funding which can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks", into which projects are assigned, based on the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects that are essential to continued safe and reliable operation of the system, and for which potential funding sources can be identified. Track Two includes projects for which the projected future levels of existing funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future, and/or the creation of new funding sources. See Chapter 2 (Funding Strategy) for more information on funding availability for various programs.

Chapter 2

FUNDING STRATEGY

BART's Capital Improvement Program (CIP) includes all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$7.8 billion. Of this total, the Track One program at a cost of \$4.9 billion is comprised of those projects for which potential sources of funding can be identified. The almost \$2.9 billion balance of the program, Track Two, serves as the basis of advocacy for increased levels of capital funding.

A summary of BART's Track One funding needs is provided in Table 1. A summary of the proposed funding sources for Track One is provided in Table 2. Details on all Track One and Track Two funding needs are shown in Chapter 3.

Systemwide Renovation Program

For 20 years after the inception of rail service in 1972, BART was considered new and state-of-the-art. Reliability improved steadily even as service levels increased. By the early 1990's, however, the effects of aging began to show up. It became apparent that stations, rail cars, and the basic system infrastructure would soon need more than just routine maintenance to continue operating reliably at ever higher levels of service. In 1993, BART evaluated the condition of the physical plant and developed a \$1.1 billion program of renovation projects needed to return the system to near-original design standards.

In 1994, as the magnitude of the program became known, BART and the Metropolitan Transportation Commission (MTC) began discussions on how to fund BART's systemwide renovation needs, resulting in joint adoption of MTC Resolution 2672. The Capital Improvement Program that BART adopted in January 1995 outlined a set of projects and a funding strategy to implement a multi-year program of rebuilding, for which Resolution 2672 and a series of planned BART bond issues formed the basis.

BART-MTC Renovation Funding Agreement (MTC Resolution 2672)

In May 1994, BART and MTC jointly adopted a cooperative funding agreement (MTC Resolution 2672) to address BART's most critical renovation needs. The agreement calls for MTC to program \$450.8 million in federal, state, and regional funds for BART renovation, and for BART to internally generate \$200.5 million as local match to the proposed grant funds. In fact, BART will have to generate substantially more than \$200.5 million in order to fund essential Track One renovation projects beyond the scope of the BART-MTC agreement.

The funding plan originally set forth in Resolution 2672 anticipated MTC programming its entire \$450.8 million commitment over the six-year period FY 1994 through FY 2000. Subsequent reductions in Congressional appropriations of transit system funding have

Table 1

Track One Program -- Funding Needs

All figures in thousands of dollars (three decimals places dropped).

Project	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002
SYSTEM RENOVATION PROGRAM								
Rolling Stock								
A- and B-car renovation	454,400	286,825	167,575	0	152,784	3,698	3,698	3,697
Other rolling stock renovation projects	11,488	10,788	700	0	0	0	0	700
Subtotal Rolling Stock	465,888	297,613	168,275	0	152,784	3,698	3,698	4,397
Mainline								
Replace running rail & accessories	30,580	5,510	25,070	2,937	3,061	1,744	4,419	463
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200	0	0	0	0	1,200
Replace sump pumps in subway tunnels	3,300	3,300	0	0	0	0	0	0
Asbestos abatement (phases 1-4)	7,144	3,353	3,791	2,500	1,291	0	0	0
Rehab traction power equipment	33,514	802	32,712	10,000	0	0	0	22,712
Repair Lake Merritt Channel subway structure	1,860	0	1,860	100	1,100	660	0	0
Other mainline renovation projects	25,181	20,160	5,021	400	684	718	617	1,965
Subtotal Mainline	106,103	36,449	69,654	15,937	6,136	3,122	5,036	38,323
Stations								
Automatic Fare Collection modernization	54,000	4,572	49,428	28,428	17,500	200	0	3,300
Replace 19 stations escalators	12,821	12,821	0	0	0	0	0	0
Renovate escalators systemwide	25,640	25,640	0	0	0	0	0	0
Renovate elevators systemwide	6,771	0	6,771	4,723	304	244	0	1,500
"Mint Station" program	34,243	10,026	24,217	3,285	3,129	0	0	17,803
Energy conservation systemwide	23,052	1,862	21,190	0	0	2,000	2,000	15,190
Other station renovation projects	37,417	28,289	9,128	1,395	489	503	519	5,346
Subtotal Stations	193,944	83,210	110,734	37,831	21,422	2,947	2,519	43,139
Controls & Communications								
Next generation control system	19,226	19,226	0	0	0	0	0	0
Fiber optic/radio network (TRACS)	60,000	0	60,000	60,000	0	0	0	0
Advanced automatic train control R&D phase	43,200	33,800	9,400	4,700	4,700	0	0	0
Advanced automatic train control implementation	52,000	0	52,000	26,000	26,000	0	0	0
Rehab wayside train control equipment	38,443	1,883	36,560	8,500	2,000	1,643	0	24,417
Replace Metro/vison destination signs	1,300	1,300	0	0	0	0	0	0
Replace Digital Transmission System	4,000	0	4,000	0	0	0	0	4,000
Other controls and communications projects	17,826	8,304	9,522	845	798	822	846	5,339
Subtotal Controls & Communications	235,995	64,513	171,482	74,045	33,498	28,465	846	33,756
Facility Renovation and Replacement								
Non-stock inventory (repairable parts provisioning)	30,412	2,412	28,000	1,800	1,900	2,000	2,200	17,700
Hayward shop traction motor repair facility reconfiguration	1,995	1,995	0	0	0	0	0	0
Employee facility improvements	2,212	212	2,000	1,566	434	0	0	0
Richmond Shop & Yard security improvement	1,067	1,067	0	0	0	0	0	0
Replace roofing on shops, towers, etc.	3,600	0	3,600	0	0	0	0	3,200
Other shop and yard renovation projects	14,359	10,647	3,712	1,170	455	180	185	1,531
Subtotal Facility Renovation and Replacement	53,645	16,333	37,312	4,536	3,189	2,180	2,385	22,431

Track One Program -- Funding Needs (continued)

All figures in thousands of dollars (three decimals places dropped).

Project	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002 2003-08
SYSTEM RENOVATION PROGRAM (cont'd)								
Work Equipment	34,432	6,201	28,231					
Work equipment projects		6,201	28,231	3,810	2,700	2,700	1,664	0 17,357
Subtotal Work Equipment	34,432			3,810	2,700	2,700	1,664	0 17,357
Subtotal System Renovation Program	1,090,007	504,319	565,688	136,159	219,729	43,112	16,148	11,137 159,403
EXTENSIONS PROGRAM								
to Colma	170,179	170,179	0	0	0	0	0	0 0
to Dublin-Pleasanton	543,050	543,050	0	0	0	0	0	0 0
to Pittsburg-Bay Point	505,740	505,740	0	0	0	0	0	0 0
to San Francisco Airport	1,167,000	79,811	1,087,189	1,087,189	0	0	0	0 0
SFO CAPRA	72,000	0	72,000	4,650	0	2,850	64,500	0 0
Power substation for SFO	12,500	0	12,500	12,500	0	0	0	0 0
to Warm Springs	702,430	55,400	647,030	0	7,000	17,000	17,000	14,000 592,030
West Dublin/Pleasanton station	39,370	0	39,370	0	0	0	0	0 39,370
Oakland Airport Connector	198,590	0	198,590	0	3,000	8,000	0	0 187,590
Pittsburg-Bay Point to Railroad Ave.	96,000	96,000	0	0	0	0	0	0 0
Extension planning	4,002	4,002	0	0	0	0	0	0 0
Subtotal Extensions Program	3,510,861	1,454,182	2,056,679	1,104,339	10,000	27,850	81,500	14,000 818,990
SEISMIC RETROFIT PROGRAM								
Seismic retrofit projects	156,801	2,258	154,543	0	0	0	0	0 154,543
Subtotal Seismic Retrofit Program	156,801	2,258	154,543	0	0	0	0	0 154,543
SERVICE IMPROVEMENT PROGRAM								
Expand Concord Shop	14,442	192	14,250	1,800	11,863	0	0	0 587
Initial expansion of Hayward Shop	8,000	0	8,000	0	0	0	0	0 8,000
Anti-graffiti program	580	580	0	0	0	0	0	0 0
Bicycle access improvements	704	0	704	0	0	0	0	0 0
Transit centers	13,414	13,414	0	0	0	0	0	0 0
Oakland Coliseum Intermodal	13,840	0	13,840	0	0	0	0	0 13,840
Other service improvement renovations	24,363	24,015	348	348	0	0	0	0 0
Subtotal Service Improvement Program	75,343	38,905	36,438	2,148	11,863	0	0	0 22,427
RESEARCH, DEVELOPMENT AND DEMONSTRATION								
Research, development and demonstration projects	4,125	4,125	0	0	0	0	0	0 0
Subtotal Research, Development and Demonstration	4,125	4,125	0	0	0	0	0	0 0
OTHER FINANCIAL OBLIGATIONS								
Other financial obligations	96,439	1,309	95,130	94,410	80	80	80	80 400
Subtotal Other Financial Obligations	96,439	1,309	95,130	94,410	80	80	80	80 400
TOTAL TRACK ONE FUNDING NEEDS	4,933,576	2,005,098	2,928,478	1,337,056	241,672	71,042	97,728	25,217 1,155,763

Table 2

Track One Program -- Proposed Funding Sources

All figures in thousands of dollars (three decimals places dropped)

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed				
				1996	1999	2000	2001	2002
SYSTEM RENOVATION & OTHER PROGRAMS								
Funding per MTC Res. 2672								
Federal Sec. 3	239,472	239,472	0	0	0	0	0	0
Federal CMAQ/STP	30,000	15,000	15,000	5,000	0	5,000	5,000	0
State Prop. 108	15,000	15,000	0	0	0	0	0	0
State TC1	1,974	1,974	6,500	1,065	0	0	0	5,435
MTC bridge tolls	24,000	12,000	12,000	4,000	4,000	0	0	0
Section 9 for AFC and rail	36,406	7,350	36,406	18,931	1,396	0	370	16,924
Unprogrammed Section 9	10,763	0	10,763	0	0	0	0	10,763
Unprogrammed Federal STP/CMAQ	25,000	0	25,000	0	0	0	0	25,000
Unprogrammed Federal Section 3	6,000	0	6,000	0	0	0	0	6,000
Unprogrammed MTC net bridge toll revenues	15,000	0	15,000	0	0	0	0	15,000
Unprogrammed forecast post-11P programming	129,000	102,624	26,376	0	0	0	0	32,000
BART 1995 bond proceeds	71,505	71,505	71,505	26,376	0	0	0	0
Planned BART 1998 bond proceeds	71,505	71,505	71,505	115,298	22,931	10,396	8,536	370
Subtotal	651,300	394,751	256,450					99,022
Other Funding								
Pre 1995 Reserves	74,143	61,616	12,527	12,527	0	0	0	0
Planned BART 1998 bond proceeds	131,495	0	131,495	82,054	49,441	0	0	0
Planned BART 1999 bond proceeds	129,000	0	129,000	0	1,146	643	82	948
Energy conservation financing	21,190	0	21,190	0	2,000	2,000	0	15,190
R&D grants	3,363	3,363	0	0	0	0	0	0
Non-2672 grants	60,686	0	0	0	0	0	0	0
State TC1	1,155	0	1,155	0	0	0	0	0
DARPA (AATC)	19,500	11,000	0	0	0	0	0	0
Private sector (AATC)	11,000	11,000	0	0	0	26,000	0	0
STP and bridge toll grants (AATC)	52,000	0	52,000	0	0	0	0	0
Allocations from operating budget per SRTP	76,303	0	76,303	8,053	3,800	0	2,150	9,400
1995 Safe Harbor Lease proceeds	1,646	0	1,646	0	0	0	0	52,800
Interest earnings	21,550	0	21,550	1,946	0	0	0	0
New Measure A for seismic retrofit	154,543	0	154,543	12,391	1,769	3,700	2,900	665
New Measure B for seismic retrofit	731,574	156,165	601,409	117,925	207,131	32,846	7,593	154,543
Subtotal	1,406,874	550,916	857,959	233,122	230,062	43,242	16,229	12,517
SUBTOTAL SYSTEM RENOVATION & OTHER PROGRAMS								322,788
EXTENSIONS								
Funding for Colima extension (FFGA)	170,179	170,179	0	0	0	0	0	0
Funding for Dublin-Pleasanton extension	543,050	543,050	0	0	0	0	0	0
Funding for Pittsburg-Bay Point extension	505,740	505,740	0	0	0	0	0	0
Funding for San Francisco Airport extension	1,167,000	79,811	1,087,189	0	0	0	0	0
Dedicated bond issue for SFO CAPRA	64,500	0	64,500	0	0	0	64,500	0
Allocations from Operating for SFO CAPRA	7,500	0	7,500	4,650	0	2,850	0	0
Dedicated bond issue for power substation for SFO	12,500	0	12,500	12,500	0	0	0	0
New Measure B funding for Warm Springs extension	332,900	0	332,900	0	0	0	0	332,900
Other grants for Warm Springs extension	369,530	55,400	314,130	7,000	17,000	10,000	14,000	259,130
New Measure B funding for West Dublin/Pleasanton station	35,070	0	35,070	0	0	0	0	35,070
Other grants for West Dublin/Pleasanton station	4,300	0	4,300	0	0	0	0	4,300
New Measure B funding for Oakland Airport Connector	120,000	0	120,000	0	0	0	0	120,000
Other grants for Oakland Airport Connector	78,590	0	78,590	0	3,000	8,000	0	67,590
New Measure B funding for Oakland Coliseum Intermodal	12,430	0	12,430	0	0	0	0	12,430
State and Local Partnership fund for Coliseum Intermodal	1,410	0	1,410	0	0	0	0	1,410
Existing Measure C funding for Bay Point to Railroad Ave. ext.	96,000	96,000	0	0	0	0	0	0
Extending planning previous BART reserves	4,002	4,002	TBD	0	0	0	0	0
Subtotal	3,524,701	1,484,162	2,070,519	1,111,339	10,000	27,850	78,500	832,830
TOTAL TRACK ONE PROGRAM	4,933,575	2,005,098	2,928,478	1,344,461	240,062	71,092	94,729	1,155,618

led MTC to reduce its forecast of funds expected to be available to the Bay Area region, and therefore to BART, over the period of this CIP. MTC's current funding projections for BART extend the period for commitment of the agreed upon funds for BART system renovation.

For example, annual programmed amounts of Section 3 funds for renovation of the A- and B-cars have been changed from the original plan, with the receipt of the full amount of programming consequently extended from FY 2000 to FY 2004. In addition, reductions in the federal Section 9 program have required MTC to identify other grant funds to replace some of the planned Section 9 funds for non-car portions of the BART renovation program. A significant portion of the Res. 2672 grant funds for systemwide renovation other than the car program are not currently expected to be programmed until after FY 2002.

Generation of BART Funds

The CIP adopted in January 1995 outlined the need for BART to issue bonds to match and supplement grants for the Systemwide Renovation Program. That CIP proposed bond issues for the spring of 1995, 1997, 1998 and 1999 to generate a total of approximately \$400 million. The source of debt service funds for this planned borrowing was proposed as a series of fare increases in 1995, 1996 and 1997 to fund the first \$200 million in bonds, and future revenue enhancement and/or cost reductions to fund the last \$200 million.

The first bond issue was sold in May 1995, netting \$129 million. The current plan is to merge the 1997 and 1998 issues, and issue it in the winter of 1997/98 in the amount of \$203 million. Financial projections carried in the companion document *Short Range Transit Plan* indicate that the combined debt service for the 1995 and 1997/98 bond issues for renovation can be sustained through a combination of the revenue produced by the series of three fare increases recently completed and modest cost containment measures. The proceeds of these bond issues will be used to provide local match for A/B car and other renovation grants, for retirement of previous debt for the purchase of C-2 cars and the telecommunications project, and to advance other renovation projects.

Track One Systemwide Renovation Program

As noted above, BART has defined a program of essential renovation requiring \$1.1 billion between inception of the program adopted in 1995 and the end of this CIP timeframe (FY 2008). Of this \$1.1 billion need, approximately 40 percent has been secured, and potential funding sources can be identified for the projects in the remaining balance of the program. The proposed funding sources are summarized in Table 2. Details for several major elements of the program are described in the following section.

A- and B-Car Renovation Program

The largest single component of the systemwide renovation program is the rebuilding of the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort is \$454,400,000. The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in federal Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in bridge toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$144 million.

The funding plan for this project is covered by a Federal Transit Administration (FTA) Letter of No Prejudice (LONP), which permitted BART to execute a contract for performance of renovation work in advance of actual receipt of most of the grant funds. The contract is comprised of a base order for renovation of the first 200 cars, fully covered by the LONP, and an option for the remaining 239 cars as additional funding becomes available. This CIP forecasts availability of funding and execution of the option in FY 1999.

Other System Renovation Projects

Renovation of the remainder of the BART infrastructure (stations, power and train control systems, maintenance facilities, etc.) will be accomplished through a variety of funding sources. Through Resolution 2672, MTC has pledged to attempt to program \$140.8 million, to be matched by \$56.5 million from BART. Other grant sources and BART revenues will be required for the remaining balance. Detail on the funding program for several large projects is provided below.

Automatic Fare Collection (AFC) Equipment Modernization

After 25 years in service, BART's AFC equipment must be modernized through a combination of replacement and renovation. This project will cost \$54-65 million, depending on the specific implementation program, yet to be decided. To date, \$25.8 million in federal Section 9 funds have been programmed over several years. BART will seek additional Section 9 programming for this project and is also applying for state STIP funding. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Rail Replacement

As train wheels grind against rail, especially on curves, the rail gradually wears away and must be replaced. This is a major, ongoing effort estimated to cost \$30.6 million by FY 08. A minimum of \$19.3 million in federal Section 9 funding has been programmed in a series of grants. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Advanced Automatic Train Control

This project is integral to BART's proposed future service plans, and also will displace a significant amount of renovation that would otherwise be required on the existing train

control system. The research and development phase is being carried out with a combination of federal defense conversion funds, matched by private sector and BART funds. Funding for implementation of AATC on the M- and upper A-lines (\$52 million) is being sought through grant sources.

Energy Conservation Program

This \$21.2 million renovation program is designed to reduce BART's use of electric power in stations, maintenance buildings, and administrative buildings. There is considerable potential for long-term operating budget savings if energy consumption can be reduced through such a program. BART is exploring the possibility of contracting with private vendors interested in advancing the capital cost of this renovation, with repayment to be made from the avoided future operating costs.

Escalator and Elevator Program

Replacement of many of the most critical station escalators, and complete renovation of other escalators and station elevators systemwide, are among BART's highest priority renovation programs. These programs, totaling \$45.2 million, have not competed well for grant funds in the past, so these efforts are proposed to be carried out primarily with BART revenues. Grant sources will continue to be pursued, but these projects must be carried out immediately, and will be funded from BART sources as necessary to keep them moving.

Track Two Systemwide Renovation Program

Additional renovation funding needs beyond what can currently be reasonably forecast to become available are also presented in this CIP, at a conceptual planning level. The Track Two renovation program comprises projects which would be highly desirable to accomplish within the next ten years, but which are not at this time considered essential to reliable operation of future service levels within that timeframe. The Track Two renovation program is estimated at nearly \$566 million, including the newly listed C-1 car renovation.

System Extension Program

From the earliest days of its planning, the BART system has been envisioned by many as an expansive network of lines which ultimately would link most of the counties in the greater San Francisco Bay Area region. Limitations on funding restricted the original construction to 72 miles of double track in San Francisco, Alameda, and Contra Costa counties. But plans for extension of the original system continued to be considered throughout the 1970's and early 1980's.

In the mid-1980's several Bay Area counties began to explore the possibility of funding various transportation improvements, including BART extensions, through increases in

sales taxes. BART was granted significant funding from sales taxes in Alameda and Contra Costa counties, and from state and other sources, for extensions in those two counties. In Contra Costa County, an extension from the former end of the line at Concord now continues to new stations at North Concord-Martinez and Pittsburg Baypoint. In Alameda County, the new branch line from Bayfair Station to Castro Valley and Dublin-Pleasanton was built. Federal grants were simultaneously secured for an extension to Colma Station in San Mateo County. All of these projects have entered service in the last two years.

San Francisco International Airport Extension

The next major planned extension of the BART rail system is from the new Colma Station to San Francisco International Airport. The funding plan for this \$1.167 billion project is currently in negotiation with various agencies, and includes the following major elements: \$750 million in federal Section 3 funds; state funds totaling \$108 million; \$10 million in regional bridge tolls; \$200 million from the Airport; and \$99 million from San Mateo County. In addition, the District will provide a \$72 million Capital Reserve Account (CAPRA) for potential grant ineligible expenses associated with the project. The CAPRA will be generated through \$7.5 million in direct allocations from operating sources to be made in FY 1998 and FY 2000, and a dedicated bond issue of \$64.5 million planned for FY 2001.

Warm Springs Extension

This planned \$702.4 million extension, as reflected in this CIP, would extend in an aerial alignment from the current end of line at Fremont Station to two new stations at Irvington and Warm Springs in southern Alameda County. This project is listed in the Track One program on the basis of an application made to the Alameda County Transportation Authority (ACTA) for the reauthorization of Alameda County's Measure B. The proposed funding plan includes \$297.7 million from a reauthorized Measure B and \$404.7 from state sources, bridge tolls, and San Mateo County.

Oakland Airport Connector

This planned \$198.6 million extension would extend in an aerial alignment from the existing Oakland Airport/Coliseum Station to Oakland Airport, in Alameda County. This project is listed in the Track One program on the basis of an application made to ACTA for the reauthorization of Alameda County's Measure B. The proposed funding plan includes \$120 million from a reauthorized Measure B and \$78.6 from federal and state sources, future bridge tolls, and the Port of Oakland.

West Dublin-Pleasanton Station

This planned \$39.4 million project would build the third station originally planned for the Castro Valley-Dublin/Pleasanton Extension, in Alameda County. This project is listed in the Track One program on the basis of an application made to ACTA for the reauthorization of Alameda County's Measure B. The proposed funding plan includes

\$35.1 million from a reauthorized Measure B and \$4.3 from state sources, future bridge tolls and other sources.

Pittsburg-Railroad Avenue Station

This planned \$200.1 million project would extend the new Pittsburg-Baypoint segment further east in Contra Costa County, to a new station at Railroad Avenue. A portion of this project is listed in the Track One program on the basis of remaining funds from the initial Measure C along with other funding sources. BART will continue to seek funding for the balance of the project, which continues to be listed in Track Two.

Seismic Retrofit Program

A portion of BART's planned Seismic Retrofit Program is newly included in Track One on the basis of an application to ACTA for the reauthorization of Alameda County's Measure B. Approximately 71 percent of BART's aerial structures are located in Alameda County. Alameda County's pro-rated share (\$154.5 million) of the cost to bring all aerial structures up to the latest seismic design standards has been submitted to the Measure B process. BART will continue to seek funding from other sources for the balance of this program, which continues in Track Two.

Service Improvements

BART and AC Transit have entered into a Memorandum of Understanding through which AC Transit will pass to BART \$12.2 million in federal funds and local match for construction of intermodal transit center improvements at eight stations. The Bay Area Air Quality Management District is providing funds for the \$704,000 program to improve the quality of bicycle access to BART stations. BART funds are programmed to implement the \$580,000 Anti-Graffiti Program, expansion of Concord Shop maintenance facilities (\$14.3 million) and the initial phase of similar expansion of the Hayward Shop facilities (\$8 million). The Oakland Coliseum Intermodal Station project is a candidate for Alameda County Measure B reauthorization funding.

Research, Development and Demonstration

BART continues to work in various R&D areas with prior grant funds, including Electric Station Cars and Superconducting Magnetic Energy Storage. Prior allocation of BART funds are being used to study possible advances in Adaptive Diagnostic Systems for improved transit vehicle reliability and faster, more efficient vehicle maintenance. BART will continue to seek grant funding for technological advances from specialized sources for which basic system renovation and expansion are not eligible.

Chapter 3

PROJECT LISTINGS: FUNDING NEEDS AND PRIORITIES

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I. SYSTEMWIDE RENOVATION PROGRAM

I-A. Rolling Stock Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment			
				1998	1999	2000	2001
A- and B-car renovation *	454,400	286,825	167,575	0	152,784	3,698	3,698
Other rolling stock renovation projects							
c Wheel upgrade program	2,000	2,000	0				
Replace electrical couplers on C-1 cars	2,200	2,200	0				
Replace batteries on A, B and C-1 cars	1,900	1,900	0				
Replace A- and B-car door components	4,688	4,688	0				
Install automatic train control restoration units	700	0	700				
Subtotal	11,488	10,788	700	0	0	0	0
* "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$15,000,000 in CMAQ, \$1,973,500 in TCI, \$15,000,000 in Prop. 108 bonds, \$12,000,000 in bridge tolls, and \$3,378,600 in BART funds.							
Total Track One	465,888	297,613	168,275	0	152,784	3,698	3,698
							4,397

I-A. Rolling Stock Renovation (Track Two)			
Priority 2	Total Cost	Funding to 6/30/97	Funding Req't.
Install automatic train control restoration units (additional)	1,700	0	1,700
C-1 car renovation	265,000	0	265,000
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	266,700	0	266,700

Category Total (both tracks)	732,588	297,613	434,975
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-B. Mainline Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment			
				1998	1999	2000	2001 2002 2003-08
c Recoat steel tunnel liner rings	786	786	0				
c Replace BHT fan controller	N/A	N/A	N/A				
c BHT fire protection mods	2,245	2,245	0				
Replace running rail & accessories	30,580	5,510	25,070	2,937	3,061	1,744	4,419 463 12,446
Rehabilitate subway ventilation fans	1,337	1,337	0				
Repaint structural girders & bridges for corrosion protection	1,812	1,812	0				
Transbay Tube cathodic corrosion protection	4,524	3,324	1,200				1,200
Replace sump pumps in subway tunnels	3,300	3,300	0				
Replace dry with wet standpipes	10,200	10,200	0				
Asbestos abatement 1,2,3	1,644	1,644	0				
Asbestos abatement 4	5,500	1,709	3,791	2,500	1,291		
Rehab traction power equipment	33,514	802	32,712	10,000	110	120	22,712
Replace traction power house roofs	420	90	330	100			
Track embankment upgrade	243	243	0				
Replace R-O-W fencing and barbed wire	930	350	580		85	90	100 210
Caltrans reimbursable projects	3,097	3,097	0				
Repair Lake Merritt Channel subway structure	1,860	0	1,860	100	1,100	660	
Emergency mainline repairs	3,346	0	3,346	300	309	318	327 337 1,755
Replace surfaces at maintenance set-on points	765	0	765		180	190	195 200
Widen I-80 overcrossing per Caltrans	N/A	N/A	N/A				
Total Track One	106,103	36,449	69,654	15,937	6,136	3,122	5,036 1,100 38,323

I-B. Mainline Renovation (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Rehab traction power equipment (additional)	35,000	0	35,000
Priority 3			
Repair structure damage in S.F. approach tunnel	1,000	0	1,000
TBT vents automatic power transfer	2,565	0	2,565
Replace TBT lower gallery lighting fixtures	180	0	180
Additional blue light safety stations	155	0	155
Remove gaps in handrail along emergency walkways	285	0	285
Remove obstructions on emergency walkways	360	0	360
TBT fan and damper control improvements	410	0	410
Additional electrical insulation at various locations	160	0	160
Motorize fire main valves in BHT	240	0	240
Replace traction power control batteries	300	0	300
Subtotal	5,655	0	5,655
Priority 4			
Dry standpipes at I-680 and Springbrook crossings	370	0	370
Tunnel hose valve plan	160	0	160
Relocate crossover at C53	7,650	0	7,650
Subtotal	8,180	0	8,180
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	48,835	0	48,835

Category Total (both tracks)	154,938	36,449	118,489
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-C. Stations Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment			
				1998	1999	2000	2001 2002 2003-08
c Replace four Embarcadero Station escalators	2,867	2,867	0				
c Replace fire mains at three stations	250	250	0				
c Cubic faregates modifications	777	777	0				
c Replace floors on ten elevators	510	510	0				
c Repair concrete roof of Lake Merritt Station	356	356	0				
c Replace and add bicycle lockers	596	596	0				
c Replace station fire alarms	350	350	0				
Automatic Fare Collection modernization	54,000	4,572	49,428	28,428	17,500	200	3,300
Interim AFC upgrades	2,320	2,320	0				
Replace AFC air dryers	N/A	N/A	N/A				
Agent ticket reader	330	330	0				
Credit-debit vendors	4,009	4,009	0				
Station security program	4,417	4,417	0				
Replace 19 station escalators	12,821	12,821	0				
Renovate escalators systemwide	25,640	25,640	0				
Renovate elevators systemwide	6,771	0	6,771	4,723	304	244	1,500
Replace station signage	1,485	1,485	0				
Replace platform edge tile	1,587	1,587	0				
Repair stair tread edges and replace anti-slip treatments (ADA) Key Station	551	551	0				
ADA Informational signage	452	452	0				
Key Station (ADA) 12th Street elevator replacement	470	470	0				
Key Station (ADA) accessible parking improvements	900	900	0				
Replace sewage pumps in underground stations	480	480	0				
Repair platform sub-surface at six stations	470	470	0				
Remove architectural barriers for accessibility	467	467	0				
"Mint Station" program	455	455	0				
Modify change machines	34,243	10,026	24,217	3,285	3,129		17,803
Replace roofing on stations	925	925	0				
Add'l faregates from storage at various stations	2,942	802	2,140	920			878
Replace bus transfer ticket machines	1,064	1,064	0				
Replace security gates at some stations	922	922	0				
MacArthur Station emergency egress improvements	327	327	0				
Energy conservation (Embarc., Lake Merritt, Hayward Shop)	150	150	0				
Energy conservation systemwide	1,862	1,862	0				
Replace lintel structures on W. Oakland platforms	21,190	0	21,190			2,000	15,190
Replace P.A. systems at all stations	1,000	0	1,000			2,000	1,000
Emergency stations repairs	850	0	850			503	850
	5,138	0	5,138	475	489	519	534 2,618
Total Track One	193,944	83,210	110,734	37,831	21,422	2,947	2,876 43,139

I-C. Stations Renovation (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
AFC expansion	20,000	0	20,000
Interim AFC upgrades (additional)	2,080	0	2,080
Various egress improvements (additional)	230	0	230
Mint Stations (additional)	18,025	0	18,025
Refurbish station agents' consoles systemwide	5,300	0	5,300
Subtotal	45,635	0	45,635
Priority 3			
Replace station parking lot signs	305	0	305
Resurface parking lots at stations as needed	2,910	0	2,910
Replace ceiling in No. Berkeley Station	1,070	0	1,070
Subtotal	4,285	0	4,285
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	49,920	0	49,920

Category Total (both tracks)	243,864	83,210	160,654
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NOTES:

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shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-D. Controls & Communications Renovation (Track One)

	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment			
				1998	1999	2000	2001
c Emergency control center back-up	29	29	0				
c Replace Maint. Vehicle Detection Devices *	373	373	0				
c Reverse running in Transbay Tube	130	130	0				
Next generation control system *	19,226	19,226	0				
Fiber optic/radio network (TRACS)* ***	60,000	0	60,000	60,000			
Advanced automatic train control R&D phase	43,200	33,800	9,400	4,700	4,700		
AATC implementation **	52,000	0	52,000		26,000	26,000	
Replace workstation consoles in Central *	746	746	0				
Rehab train control equipment	38,443	1,883	36,560	8,500	2,000	1,643	24,417
Replace MetroVision destination signs	1,300	1,300	0				
Portable radios for station agents and maintenance pers.	N/A	N/A	N/A				
Comspec position in Central	265	195	70	70			
Replace MARIS (MIS) software	1,615	1,615	0				
Cash handling improvements	1,207	1,207	0				
Train ID enhancement	1,472	1,472	0				
Yard train control improvements	1,937	1,937	0				
MIS mainframe computer	600	600	0				
Replace Digital Transmission System	4,000	0	4,000				4,000
Replace yard cable plant	550	0	550				550
Emergency controls and communications repairs	8,292	0	8,292	775	798	822	846
Replace cable plant (excl. T1) systemwide	480	0	480				
Replace wayside cable plant splice boxes syswide	130	0	130				
Total Track One	235,995	64,513	171,482	74,045	33,498	28,465	872
							33,756

* Does not include portions funded in extensions budgets.

** Preliminary estimate--actual cost to be determined based on funding strategy. If

AATC is not implemented, then conventional resignaling needed on A-line.

*** These projects are included as parts of the fiber optic/radio network.

I-D. Controls & Communications Renovation (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Rehab train control equipment (additional)	35,000	0	35,000
Replace non-Metro/Vision destination signs	5,000	0	5,000
Subtotal	40,000	0	40,000
Priority 3			
Yard tower data network	670	0	670
Replace yard voice recorders	260	0	260
Replace CATV and CCTV systemwide	310	0	310
Subtotal	1,240	0	1,240
Priority 4			
Replace T1 cable systemwide ***	N/A	N/A	N/A
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	41,240	0	41,240

Category Total (both tracks)	277,235	64,513	212,722
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NOTES:

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c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-E. Facility Renovation and Replacement (Track One)									
	Total Cost	Funding to 6/30/97	Funding Req't.	1998	1999	2000	2001	2002	2003-08
c Replace Hayward wheel press	673	673	0						
c Richmond oil/water separator tanks	197	197	0						
c Wheel/rail maintenance study	300	300	0						
c Wheel truing machines	3,616	3,616	0						
Non-stock inventory (repairable parts provisioning)	30,412	2,412	28,000	1,800	1,900	2,000	2,200	2,400	17,700
Hayward Shop traction motor repair facility reconfiguration	1,995	1,995	0						
Replace dust collector systems at Richmond & Concord	1,247	1,247	0						
Central receiving/distribution warehouse facility (study)	400	400	0						
Employee facility improvements	2,212	212	2,000	1,566	434				
Overhaul transit vehicle washers (Rich, Conc, Hay)	1,538	538	1,000	1,000					
Reconfigure transportation buildings	2,295	2,295	0						
Transfer track crossings	360	360	0						
Yard fuel tanks	23	23	0						
Metro bldg. fuel tank	189	189	0						
1000 volt power supplies	63	63	0						
Rich. Yard efficiency modifications	353	353	0						
Richmond Shop & Yard security improvement	1,067	1,067	0						
Replace Hayward Shop fire main	235	235	0						
Hayward test track security improvement	108	108	0						
Replace purchasing & inventory control system	570	0	570						570
Replace parts washing facilities in all shops	330	50	280						
Emergency shop repairs	1,862	0	1,862	170	175	180	185	191	961
Replace roofing on shops, towers, etc.	3,600	0	3,600		400				3,200
Total Track One		53,645	16,333	4,536	3,189	2,180	2,385	2,591	22,431

I.E. Facility Renovation and Replacement (Track Two)

	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Lake Merritt Building renovation	7,000	0	7,000
New administrative headquarters building	60,000	0	60,000
Subtotal	67,000	0	67,000
Priority 3			
Recondition shop sump pumps (Rich, Conc, Oak)	260	0	260
Second wheel/axle press (location TBD)	1,550	0	1,550
Rehabilitate and reconfigure Oakland Shop	75,160	0	75,160
Recondition overhead cranes (Hay, Rich, Conc, DC)	1,225	0	1,225
Paint and repair facility	2,000	0	2,000
Train operator training simulator	1,000	0	1,000
Additional tracks at Hayward Yard	100	0	100
Central receiving/distribution warehouse facility (impl.)	6,000	0	6,000
Subtotal	87,295	0	87,295
Priority 4			
Replace shop roll-up doors (Rich, Hay, Conc, Oak)	1,250	0	1,250
Replace shop radiant heaters	200	0	200
Resurface roads/parking and relamp shop/yard exterior light	310	0	310
Replace grease/oil facilities (Hay, Rich, Conc, DC)	160	0	160
Repaint shop floors	515	0	515
Replace yard disconnect enclosures	620	0	620
Corrosion protection isolation of yard traction power	3,200	0	3,200
Storage area canopy, lighting and office at Richmond Shop	180	0	180
Subtotal	6,435	0	6,435
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	160,730	0	160,730

Category Total (both tracks)	214,375	16,333	198,042
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NOTES:

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All figures in thousands of dollars (three decimals places dropped).

I-F. Work Equipment (Track One)		Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment					2003-08
					1998	1999	2000	2001	2002	
Replace tools and test equipment	4,303	987	3,316	400	400	400	400	300	0	1,816
Office equipment, PC's, LAN's, WAN's	7,536	1,496	6,040	860	500	500	500	350	0	3,830
Replace automotive type vehicles	14,000	1,684	12,316	1,605	1,200	1,200	1,200	600	0	7,711
Replace non-revenue rail vehicles	8,450	1,891	6,559	945	600	600	600	414	0	4,000
Miscellaneous	143	143	0	0	0	0	0	0	0	0
Total Track One	34,432	6,201	28,231	3,810	2,700	2,700	2,700	1,664	0	17,357

I-F. Work Equipment (Track Two)

	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 3			
Miscellaneous	4,130	0	4,130
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	4,130	0	4,130

Category Total (both tracks)	38,562	6,201	32,361
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NOTES:

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All figures in thousands of dollars (three decimals places dropped).

II. Extensions (Track One)	Total Cost	Funding to 6/30/97	Funding Req'd.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002 2003-08
c to Colma (1)	170,179	170,179	0					
c to Dublin-Pleasanton (1)	543,050	543,050	0					
c to Pittsburg-Bay Point (1)	505,740	505,740	0					
c to San Francisco Airport (2)	1,167,000	79,811	1,087,189	1,087,189				
SFO CAPRA (3)	72,000	0	72,000	4,850		2,850	64,500	
Power substations for SFO	12,500	0	12,500	12,500				
to Warm Springs (4)	702,430	55,400	647,030		7,000	17,000	14,000	592,030
West Dublin/Pleasanton station (4)	39,370	0	39,370					39,370
Oakland Airport Connector (4)	198,590	0	198,590		3,000	8,000		187,590
Pittsburg-Bay Point to Railroad Ave. (5)	96,000	96,000	0					
Extension planning	4,002	4,002	TBD					
¹ "Total Cost" shown is programmed funding. Actual final cost to be determined upon financial close-out of projects. ² Estimated cost of proposed project in current Locally Preferred Alternative; proposed funding plan includes \$750M total from FTA (\$55M has been appropriated to date), \$99M total from the recently executed Amendment to the BART-Sam Trans Agreement (\$9.25M has been appropriated to date), \$108M total in state funds (\$14.56M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$1M received to date) and \$200M from the S.F. Airport itself ³ Capital Reserve Account for grant-ineligible expenses of S.F. Airport Extension. ⁴ Projects submitted for consideration in Alameda County Measure B re-authorization process. ⁵ Track One portion of project, for which funding can reasonably be forecast. See additional increment in Track Two below.								
Total Track One	3,510,861	1,454,182	2,056,679	1,104,339	10,000	27,850	81,500	14,000 818,990

II. Extensions (Track Two)			
	Total Cost	Funding to 6/30/97	Funding Req't.
Priority 2			
Pittsburg-Bay Point to Railroad Ave. (6)	104,100	0	104,100
Power substation for DPX	3,800	0	3,800
Phase 2 and 3 Extensions	TBD	0	TBD
to Antioch			
through West Contra Costa			
to Livermore			
within San Francisco			
through San Ramon Valley Corridor			
to Santa Clara County			
Commuter Rail (7)	TBD	0	TBD
Subtotal			
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	107,900	0	107,900

⁶ Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

⁷ BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State recently approved BART management of the Capitol Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.

Category Total (both tracks)	3,618,761	1,454,182	2,164,579
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NOTES:

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c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

III. Seismic Retrofit Program (Track One)

	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment				
				1998	1999	2000	2001	2002
Support of Caltrans seismic work (reimbursable)	2,258	2,258	TBD					
Seismic retrofit of aerial structures *	154,543	0	154,543					154,543
<p>* This element is for retrofit of aerial structures in Alameda County (71% of total aerial mileage), which is under consideration for Measure B re-authorization funding. See also Track Two program below for balance of aerial retrofit program.</p>								
Total Track One	156,801	2,258	154,543	0	0	0	0	154,543

III. Seismic Retrofit Program (Track Two)

Priority 2	Total Cost	Funding to 6/30/97	Funding Req't.
Seismic rack anchors & vehicle support tiedowns	400	0	400
Seismic restraints on overhead cranes	200	0	200
Engine-generators for earthquake standby power #1	4,500	0	4,500
Engine-generators for earthquake standby power #2	2,160	0	2,160
Seismic structural evaluation of aerial structures	1,145	0	1,145
Seismic retrofit of aerial structures	63,907	0	63,907
Seismic sensing system upgrade	2,500	0	2,500
Gas valve automatic seismic shut-offs	170	0	170
Retrofit Transbay Tube seismic joints	620	0	620
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	75,602	0	75,602

Category Total (both tracks)	232,403	2,258	230,145
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NOTES:

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shading indicates project active in FY98

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

IV. Service Improvements (Track One)										
		Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment					
					1998	1999	2000	2001	2002	2003-08
c	BayFair transit center	1,007	1,007	0						
c	Concord transit center	2,178	2,178	0						
c	Walnut Creek transit center	2,930	2,930	0						
c	Daily City transit center	7,100	7,100	0						
	Expand Concord Shop	14,442	192	14,250	1,800	11,863				587
	Initial expansion of Hayward Shop	8,000	0	8,000						8,000
	Anti-graffiti program	580	580	0						
	Bicycle access improvements	704	704	0						
	Pathfinder sign program prototype	230	230	0						
	Hayward transit center	2,530	2,182	348	348					
	Pittsburg park/ride	1,761	1,761	0						
	Ashby Station parking redesign	288	288	0						
	System Capacity Study	150	150	0						
	Pl. Hill park/ride for I-680/24 mitigation	689	689	0						
	El Cerrito Plaza transit center (AC Transit funding)	260	260	0						
	Richmond transit center (AC Transit funding)	1,418	1,418	0						
	Fremont transit center (AC Transit funding)	2,707	2,707	0						
	Fruitvale transit center (AC Transit funding)	2,880	2,880	0						
	South Hayward transit center (AC Transit funding)	1,223	1,223	0						
	Coliseum transit center (AC Transit funding)	875	875	0						
	Union City transit center (AC Transit funding)	2,533	2,533	0						
	System access planning	150	150	TBD						
	Station area development planning	1,019	1,019	TBD						
	West Oakland transit center (AC Transit funding)	349	349	0						
	El Cerrito Plaza access and station area improvements	5,500	5,500	0						
	Oakland Coliseum Intermodal Station	13,840	0	13,840						13,840
Total Track One		75,343	38,905	36,438	2,148	11,863	0	0	0	22,427

IV. Service Improvements (Track Two)

	Total Cost	Funding to 6/30/97	Funding Req'd.
Priority 2			
A-line traction power enhancements	21,200	0	21,200
M-line traction power enhancements	47,550	0	47,550
C-line traction power enhancements	6,500	0	6,500
R-line traction power enhancements	22,500	0	22,500
Subtotal	97,750	0	97,750
Priority 3			
West Oakland access and station area improvements	TBD	0	TBD
Fruitvale access and station area improvements	TBD	0	TBD
Union City access and station area improvements	TBD	0	TBD
Rockridge access and station area improvements	TBD	0	TBD
Additional Capacity Enhancement Program *	2,000,000	0	2,000,000
Subtotal	2,000,000	0	2,000,000
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	2,097,750	0	2,097,750

* Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities; in order to support an increase in daily patronage from 369,000 daily under the currently projected growth plan, to 500,000 daily under and "Additional Capacity Enhancement" program.

Category Total (both tracks)	2,173,093	38,905	2,134,188
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NOTES:

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c indicates completed project
All figures in thousands of dollars (three decimals places dropped).

V. Research, Development and Demonstration (Track One)	Total Cost	Funding to 6/30/97	Funding Req'd	Fiscal Year Commitment			
				1998	1999	2000	2001 2002 2003-08
Electric Station Cars demonstration	1,440	1,440	0				
Electric vehicle charging kiosk demonstration	1,100	1,100	0				
Superconducting Magnetic Energy Storage	350	350	0				
Adaptive diagnostic systems	123	123	0				
Sound mitigation/noise reduction program	350	350	0				
R&D program	762	762	TBD				
Total Track One	4,125	4,125	0	0	0	0	0 0 0

V. Research, Development and Demonstration (Track Two)			
Priority 2	Total Cost	Funding to 6/30/97	Funding Req'd.
Sound mitigation/noise reduction program (additional)	TBD	0	TBD
Adaptive diagnostic systems (additional)	3,741	0	3,741
Superconducting Magnetic Energy Storage (additional)	669	0	669
Traction power optimization	TBD	0	TBD
Other	TBD	0	TBD
<i>All Track Two project cost estimates are conceptual, for planning purposes only</i>			
Total Track Two	4,410	0	4,410

Category Total (both tracks)	8,535	4,125	4,410
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NOTES:

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c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

VI. Other Financial Obligations (Track One)									
	Total Cost	Funding to 6/30/97	Funding Req't.	Fiscal Year Commitment					2003-08
				1998	1999	2000	2001	2002	
Other financial obligations (C-2 car bonds, A/B float cars, MetCenter reserve, Daly City reserve, project development)	96,439	1,309	95,130	94,410	80	80	80	80	400
Total Track One	96,439	1,309	95,130	94,410	80	80	80	80	400

VI. Other Financial Obligations (Track Two)			
Priority 2	Total Cost	Funding to date	Funding Req't.
	0	0	0
Total Track Two			
Category Total (both tracks)			
96,439		1,309	95,130

NOTES:

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Chapter 4

PROJECT DESCRIPTIONS

System Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful life of the various components of the physical plant.

Rolling Stock Renovation

A- and B-car Renovation

The renovation of the District's original fleet of A- and B-cars is essential to enable BART to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. The A- and B-cars will be 25 years old prior to renovation and have never been overhauled. The renovation will replace worn out and obsolete components and return the vehicles to their original design specifications. Systems to be replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of new car cost.

Replace Electrical Couplers on C-1 Cars

The existing "pin-type" inter-car electrical couplers on BART cars are very high maintenance items. Conversion to "button-type" couplers will reduce maintenance requirements and car out-of-service time.

Replace A- and B-car Door Components

Malfunctions of the door systems on A- and B-cars is a major factor in service disruptions, and as such is being addressed earlier than can be accomplished through the whole-car renovation program. One problem is expansion of the foam comprising the door core, which then delaminates the door structures and causes jams. Another problem is corroded door suspension rails are also contributing to door failures.

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically increase the speed with which recovery from such failures can be accomplished, thereby putting temporarily disabled on-line trains back in service much faster. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

Mainline Renovation

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline which have deteriorated, or will in the next ten years, due to age and use. Many components of the trackway and traction power systems are over 25 years old, are failing with increased frequency and must be reconditioned or replaced. Mainline renovation will prevent rail and traction power failures which would cause disruption and delays to revenue service. The Mainline Renovation projects include:

Recoat Tunnel Liner Rings for Corrosion Protection

The steel rings that line BART tunnels periodically have to undergo heavy maintenance periodically, including removal of corrosion encrustation, sandblasting, and application of corrosion-resistant coating. This essential work was done recently to avoid further corrosion and consequent structural deterioration and weakness.

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require changeout on a three- to five-year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency evacuation and for maintenance crews working in subway sections. In the past, failures of fans have been experienced due to cracks that developed in the blades, causing the blades to fail. An engineering analysis was made of all ventilation fans throughout the system, which determined that the blades require replacement.

Recoat Structural Girders and Bridges for Corrosion Protection

The BART aerial structural girders and bridges are now undergoing their first complete rehabilitative repainting since their construction in the 1960's and early 1970's. This work is essential to avoid corrosion and consequent structural deterioration and weakness.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes which attract and consume the corrosive elements. These anodes must be replaced on a cycle of about every ten years.

Replace Sump Pumps in Subway Tunnels

The sump pumps which keep BART subway tunnels dry are 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keeping the system safe and reliable.

Replace Dry with Wet Standpipes

This nearly complete project is replacing dry standpipes with wet (water-filled) standpipes for improved fire-fighting capability.

Asbestos Abatement

The 1989 Loma Prieta earthquake disrupted asbestos insulation in train control electronics rooms at various locations around the District. These rooms can now be entered by maintenance personnel only when they are fully protected against potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive.

Traction Power Renovation

This is a long-term program to rehabilitate a wide range of traction power components and subsystems as these items continue to age and deteriorate, leading to lower reliability and higher potential for service disruption. Individual items will include reconditioning of rectifiers and replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, cabling, switch enclosures, and gas-pressure pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system have been identified as being in critical need of repair. The roofs are constructed of steel decking and in some cases, are rusting through. Water incursion into substations can result in traction power failures and serious service disruption.

Track Embankment Upgrade

This project will correct and upgrade a faulty, eroding track embankment situation between Union City and Fremont Stations.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or due to vandalism. This is a critical safety item.

Stations Renovation

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. Stations Renovation projects include:

Replace Automatic Fare Collection Equipment

The Automatic Fare Equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore is difficult and costly to maintain. The project, as currently defined at a cost of \$54-\$65 million depending on the implementation plan yet to be selected, will replace all ticket vendors, addfares and Cubic faregates, and recondition the IBM faregates. The project needs to be done in order to: decrease revenue collection and maintenance costs through use of more modern servicing modules; increase revenue security and accountability through use of sealed coin and bill units; implement an upgraded Data Acquisition System; and increase equipment availability for customers through greater reliability and maintainability. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as existing equipment approaches the end of its useful service life. To the extent that the regional multi-operator Translink "universal" ticket program is integrated with BART fare equipment, there is additional rationale for a reliable, modern AFC system.

Accessible AFC Equipment (ADA compliance)

This project will bring the BART Automatic Fare Equipment system into compliance with ADA requirements. This will include provision of automated voice guidance in fare-card vending machines and gate improvements to facilitate wheelchair access.

Credit-Debit Vendors

This project is providing new fare-card vending equipment in a number of high volume stations to permit the sale of high value fare-cards with both credit and debit bank cards.

Station Security Program

This project is increasing the illumination levels of surface parking lots, adding emergency police call boxes in parking lots, and providing decentralized satellite station structures to accommodate community-based deployment of BART police forces.

Replace and Rehabilitate Escalators and Elevators

Other than at Embarcadero Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads, particularly in the various downtown subway stations. After 25 years of use and wear-and-tear, they are becoming unreliable, a major source of patron dissatisfaction and uneconomical to maintain and repair on a routine basis. Several of the most

unreliable escalators will be replaced, and all of the other escalators and elevators will be completely reconditioned.

Replace Maps and Signs in Stations

This project is updating and replacing outdated maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project is providing a graphic display system that is more flexible and more easily updated than the old maps, which had not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations and are delaminating from the platforms as well. They need to be replaced to remain safe, functional, and in compliance with ADA.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment must be renewed in order to protect the safety of those who use the stairs, especially during wet weather.

Key Station (ADA) Accessibility Improvements

These projects are providing federally mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for accessible car and van parking. These projects are needed to comply with ADA requirements and to improve passenger comfort and convenience.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the BART system opened 25 years ago. They are becoming increasingly unreliable and uneconomic to maintain. These pumps must be functional as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to begin to lift and create potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. It is necessary to reconstruct the sub-surfaces to allow a stronger bond for the tiles.

Repair Concrete Roof of Lake Merritt Station

This project repaired the structurally deteriorated concrete roof and replaced waterproofing over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof caused water leakage in the south stairway area making it necessary to close that stairway whenever it rained. Implementation of this repair work restored the structural integrity of the concrete roof and provides safe and uninterrupted patron access between mezzanine and platform levels.

"Mint Stations" Program

This is a multi-year program to improve the passenger experience in the BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted, and retiled as necessary. Weather-protection canopies and windbreaks are being renovated as needed. Repairs are being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Modify Change Machines

The change-making machines throughout the BART system are being retrofitted to provide better reliability and improved cash collection efficiency.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards, protect equipment and furnishings, and avoid structural damage, roofing must be replaced on a periodic basis.

Refurbish and Install In-Storage Faregate Units

The District has drawn 30 faregate units from long-term storage, which are being refurbished and installed at various locations where exit faregate queuing problems occur.

Replace Bike Lockers

The original bicycle storage lockers at stations had deteriorated to the point of not providing an acceptable level of security and weather protection, and have been replaced.

Replace Bus Transfer Ticket Machines

The machines in BART stations which issue transfer tickets are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus service. These machines are being replaced.

Energy Conservation Lighting Retrofit in Stations

The 25-year-old lighting systems in most BART stations consume far more electricity than equivalent modern systems. This project is replacing those outdated systems with new equipment which will generate substantial energy conservation and consequently significant operating savings.

Replace Lintel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts and lintels which are cracking and deteriorating due to vibration. This project would replace those lintels with a different type of structure less susceptible to vibration damage.

Replace/ Recondition Station Public Address Systems

This project would recondition or replace, as warranted, public address systems at those stations where the volume and/or voice quality of the existing installation has deteriorated to the point of not being able to provide an acceptable level of information to patrons.

Refurbish Station Agent Consoles

The electronics in the station agent consoles are still the original installations. Most of these electronics are obsolete and are no longer supported by manufacturers, making the maintenance of these increasingly unreliable units time-consuming and excessively expensive.

Controls & Communications Renovation

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. Controls & Communications Renovation projects include:

Replace Maintenance Vehicle Detection Devices

This project replaced the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These essential vehicle detection devices allow Central Control to observe the location of on-track maintenance vehicles, and serve as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The new units replaced those which had been in service over 24 years, with increasingly higher failure rates. When a failure occurred, the high-rail maintenance vehicle had to be removed from the mainline track, per PUC requirements, resulting in non-productive time in maintenance work schedules and the need for single tracking.

Reverse Running In Transbay Tube

In the past, the train control electronics restricted reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification to the train control electronics is providing the necessary signaling to allow up to three trains simultaneously in the Tube.

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems included in this budget are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project is needed to replace the 25-year-old computers running the DAS and DSS systems and the 15-year-old CCS computers.

Fiber Optic/ Radio Telecommunications Network

This project is furnishing and installing a systemwide fiber-optic and multi-frequency trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The current radio system has several significant shortcomings, both in terms of capacity and reliability, which have frequent negative operational impacts and occasionally affect safety. This project is being implemented through an innovative joint development program, with significant long-term revenue potential.

Advanced Automatic Train Control

This project is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project will allow system throughput to increase from the current 17 trains per hour up to 30 trains per hour. The system will be one which can be installed over the existing control equipment with relative ease and no service disruptions. The project will help BART to meet the increased demands on the system as headway reductions become necessary in the future, as well as displace significant needs for train control renovation.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Train Control Renovation

This is a long-term program to replace vital train control components and subsystems which are becoming unreliable due to age and difficult to maintain due to obsolescence. Most of these components are no longer being produced and are no longer supported by manufacturers. If this work is not completed in a timely manner, essential train control hardware failures will lead to extensive disruption of service. This

program will also replace the Sequential Occupancy Release System, (SORS). SORS is a Public Utilities Commission required back-up safety system to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the vital train control system. The primary SORS computer is 25 years old, is obsolete, and becoming difficult to maintain. This safety-critical system must remain operational and reliable.

Second Communications Specialist Position In Central Control

As the extensions become operational and the number of trains on-line increases, it is necessary to have a second position from which BART communications specialists can make essential announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MARIS

This project is replacing the District's 25-year-old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Replace MetroVision Sign Units

This project will replace the MetroVision sign units in the downtown San Francisco and Oakland stations. These units, which display train destination and general BART information, along with commercial advertising and public service messages, will be removed upon expiration of the current MetroVision contract. They will be replaced with the same type of updated dot-matrix sign units now being used in the new extension stations.

Replace Yard Voice Recorders

Located in each train storage and dispatch yard are multi-channel voice recorders which record all communications regarding train movements. This information can be critical in determining exactly what occurred in the event of any sort of accident involving trains in the yards. The existing units are becoming unreliable and hard to maintain.

Facility Renovation and Replacement

The purpose of this program of projects is to address the deterioration of the shops and yards due to 25 years of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. These projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance, and by reducing vehicle out-of-service time and keeping as many vehicles in service as possible, thereby reducing train crowding; make the shops and yards safer places in which to work; provide cost savings to the District by reducing maintenance turn-around time and eliminating travel time to and from vendors; and

improve the efficiency of the shops and yards by providing employees with dependable equipment needed to perform their duties effectively. Shops & Yards Renovation projects include:

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all high-value repairable parts in support of all transit vehicles, station and field equipment, and AFC equipment. Failure to provide for these requirements could lead to vehicles out-of-service and potential disruption to normal maintenance and service operations. This on-going need must be funded annually.

Wheel Truing Machines

This project replaced a 25-year-old wheel truing machine in the Hayward Shop. A new, second wheel truing machine was also installed at the Richmond Shop. The new, more reliable and higher capacity truing machines allow the District to go to a higher standard of preventive maintenance for wheel profiles, which result in increased productivity and lower load factors since fewer cars are being held out-of-service waiting for wheel re-profiling.

Hayward Shop Traction Motor Repair Facility

This project will renovate the shop and replace maintenance equipment to support BART's aging fleet. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars will be held out of service for repairs in the future.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow-pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants, and provides renovation of shop heating and cooling systems.

Central Receiving and Distribution Warehouse Facility

The District will face increased need for inventory of materials as the new system extensions are coming on-line, as the size of the operating fleet increases, and as parts must be stocked for A- and B-cars as configured both before and after renovation. A new central receiving and distribution warehouse facility would meet those needs.

Employee Facilities Improvements

The infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building have not changed materially since the BART system opened. This project will provide basic essential reconditioning and remodeling as needed to provided acceptable work environments.

Overhaul Transit Vehicle Washers

The facilities used to wash the exterior of transit vehicles are still the original installations. They are becoming increasingly inefficient, and do not comply with current

standards for containment and treatment of chemical-laden waste water. This project will bring the washers back up to original functionality and provide acceptable control of waste.

Reconfigure and Renovate Transportation Buildings

These buildings at the train dispatch yards provide the essential administrative facilities for on-site train operations, as well as lunch/breakrooms, locker rooms, and other support facilities for on-duty train operators. The current configuration of these buildings is inadequate to serve the increased number of operators required to provide higher levels of service associated with the new system extensions. At the same time, the existing structures will be reconditioned and remodeled as necessary, as in the Employee Facilities Improvement project.

Yard Fuel Tanks

This project will install 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement which will eliminate the need to bring maintenance vehicles from these outlying yards all the way into the Oakland Yard, as is now the case, to refuel.

MetroCenter Building Fuel Tank

The 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is no longer in compliance with regulations for underground fuel storage. BART has been ordered by Alameda County to replace the tank.

Yard Efficiency Improvements

This project reconfigured trackwork at the Richmond Shop to improve staging and routing of cars.

Replace Parts-Washing Facilities in All Shops

This project replaces parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities if found not to be in compliance.

Replace Roofing On Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as they deteriorate due to age and exposure.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lifting units must be assured through periodic reconditioning.

Work Equipment

The purpose of this program is to replace worn and obsolete maintenance and service vehicles and maintenance equipment. This equipment includes such items as tools, power generator sets, light towers, grounds and buildings maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police and personnel sedans, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from use. Eventually it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by rail but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Castro Valley and Dublin/Pleasanton

This project, which opened in May 1997, is a 13.8-mile double-track, new branch line extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project at Dublin-Pleasanton. Currently, there are two stations on this extension: one in Castro Valley located at I-580 and Redwood Road, and a second station in East Dublin-Pleasanton near Hacienda Business Park. A third station at West Dublin-Pleasanton near Stoneridge Mall will be added when funding has been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8-mile double-track extension, having two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements were made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point opened in December 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

San Francisco Airport

The proposed San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at Hickey, Tanforan, and Millbrae. This extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient transportation link between BART and CalTrain and to the West Bay communities.

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District.

Oakland Airport Connector

The Oakland Airport Connector Project will directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project. Other technologies and funding sources are also being evaluated.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with the expected host communities, and will pursue funding for further planning and development of these projects, but funding constraints indicate that their implementation will not be likely within the timeframe of this current capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors faster than the BART system itself can be extended, is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program

could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area.

Seismic Retrofit Program

The purpose of this program of projects is to bring the existing system up to the latest seismic standards to enhance the system's ability to safely endure severe earthquakes and quickly return to service by:

Improving the structural strength of BART's aerial structures and Transbay Tube joints in order to withstand greater seismic forces.

Improving the system of seismic detectors which slows or stops trains in the event of an earthquake.

Installing automatic seismic gas shut-off valves.

Providing engine-generators for the event of a possible PG&E power loss.

Providing restraints for overhead crane structures at maintenance shops.

Providing tie downs for the stands that transit vehicles are supported on during maintenance at the shops.

The structural strengthening components of this project will bring existing structures up to current seismic standards, and improve the ability of the system to withstand major earthquakes with little or no damage. Other components of this project will augment earthquake preparedness systems already in place to provide more coverage, more detailed and accurate information, and to permit faster response to protect the safety of the rail system, its patrons and employees.

Service Improvements Program

Hayward, Bay Fair, Concord, Walnut Creek, and Daly City Transit Centers

All of these projects are now operational. They improve traffic circulation in the vicinity of the stations, and improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities.

Additional Transit Centers

BART and AC Transit have entered into a Memorandum of Understanding in which AC Transit will pass federal section 9 funds through to BART to fund construction of transit centers at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations.

Reconfigure, Renovate & Enlarge Hayward and Concord Shops

The increasing size of the operating fleet requires that the heavy maintenance facilities at these two shops be reconfigured, renovated and expanded in order to increase their efficiency adequate to properly maintain the expanded fleet. These expansions are also essential to reducing the amount of time cars are held out of service for maintenance and repairs.

Oakland Coliseum Intermodal Project

This project would create a multi-modal transportation hub to facilitate transfers and access to services for users of BART, AC Transit, private shuttle buses, the proposed BART/Oakland Airport Connector, Capitol Corridor rail service, the Oakland Coliseum Complex, and the surrounding commercial and residential developments. It would include improvements to the pedestrian bridge which links BART, the Coliseum, the planned Capitol Corridor rail station, and the proposed Connector; accessibility improvements; bus intermodal improvements; improved vertical circulation and other BART station modifications; and security improvements.

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate patronage growth to 369,000 daily trips. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate growth to 500,000 daily trips. The Additional Capacity Enhancement subprogram is conceptual and still under development, but it would include additional transit vehicles; additional traction power and train control renovation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities beyond the projects listed separately in this *Capital Improvement Program*. This cost indicated for this item provides a preliminary estimate of what these additional improvements might entail.

West Oakland Access and Station Area Improvements

This still-conceptual project would be constructed in the area near West Oakland Station that is being considered for use by other agencies for the Cypress Corridor freeway replacement and inter-city rail service. The scope, cost and schedule for the project is subject to the results of these various planning activities.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Research, Development & Demonstration

Superconducting Magnetic Energy Storage (SMES)

Two related projects are intended to study the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains at closer headways to support projected future service levels. Two different approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations) and high temperature superconducting materials.

Electric Station Cars

The District is funded for a demonstration program to purchase 45 electric cars to be used by BART and PG&E employees for access to and egress from stations. The project will demonstrate that with "station cars", transit can provide an all electric door-to-door service that will attract new patronage.



San Francisco Bay Area
Rapid Transit District

CAPITAL IMPROVEMENT PROGRAM

July 1998 through June 2009
Fiscal Years 1999 - 2009



Adopted December 3, 1998

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CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1999 - 2009

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration under the Federal Transit Laws, 49 U.S.C. Chapter 53 and passed through the Metropolitan Transportation Commission (MTC). This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation, and does not preclude future labor contract negotiations or future BART Board deliberations regarding fares.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

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Department of Capital Development & Control
San Francisco Bay Area Rapid Transit District

November 24, 1998

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Chapter 1

CONTEXT AND ORGANIZATION OF THE PROGRAM

Context of the Program: Progress and Challenges

Renewing the BART System

Entering its third decade of service in the early 1990s, twenty years after opening for service, the BART system reached a critical point in its evolution. The original sheen of newness had worn. The passage of time and the carriage of over a billion passengers had taken a toll on BART rail cars and stations, affecting their reliability and appearance. Many electronic and mechanical systems were approaching the end of their original design lives. It was time to begin reinvesting in the physical plant to ensure continuing service quality and reliability.

Making Progress in Renovation

BART is meeting the challenge. By 1995, BART had developed an initial phase program of systemwide renovation, forecast to take up to ten years to complete, at an estimated cost of \$1.1 billion. Also by 1995, the District had developed a realistic financial plan for the program anchored by substantial grant funding and supplemental, necessary fare increases to generate a major share of the required funding internally.

The good news for BART customers is that in 1998, only three years into the ten-year program outlined in 1995, 41 of the 109 renovation projects have already been successfully completed and 54 of those projects are underway. One of the first projects completed was the replacement of seat covers, upholstery, and carpet in 100 of BART's oldest rail cars. Eight stations have undergone a major program of intensive cleaning, painting, repairs to equipment and structures, and refurbished landscaping.

Many other recent improvements are also readily noticeable to our riders, such as the replacement of the old bus transfer ticket dispensers in the East Bay stations (with West Bay machines soon to follow), the replacement of twenty-three escalators in downtown San Francisco stations, the addition of thirty faregates to improve passenger flow, significant station security improvements, and the replacement of old bicycle lockers. These projects were designed to improve the quality of transit for BART passengers. Less visible projects include several intended to improve the system's long-term operational reliability. Chapters 2 and 4 detail the status of the delivery of the renovation program.

Much of the funding for the renovation program has been secured and a sound financial plan to bring the rest of the program to fruition has been developed. Developments in the financial plan since publication of the last *Capital Improvement Program (CIP)* are significant. The \$650 million grant funding commitment in MTC's Resolution 2672 has been solidified with the programming of Section 9 and Section 3 funds between fiscal years 1997 and 2006. BART's obligation to internally generate \$200 million in supplemental funding was achieved in March 1998 with the sale of a second bond issue (the first was in 1995) dedicated primarily to system renovation. Outside of the Resolution 2672 framework, BART and its funding partners secured additional grant commitments totaling \$47 million for the Advanced Automatic Train Control project during the past fiscal year. Chapter 3 presents more detail on the financial plan for renovation and other capital programs.

Remaining Challenges in Renovation

BART has made significant progress in the renovation program, yet some challenges remain. On the program delivery side, the challenge is to optimize the use of the funds that will come in over the next several years in ways that maximize the benefit to BART riders. From the perspective of BART riders, fiscal year 1999 will be marked by several highly visible milestones intended to improve the ridership experience. The first renovated cars from the original fleet will return to service. These renovated vehicles will have completely renovated interiors, as well as new mechanical, electrical, and propulsion systems. Also in this next fiscal year, four more stations will undergo major interior and exterior renovation. The overhaul of elevators and escalators systemwide will begin. Major new accessibility improvements will be started (see details below). Contracts to improve the reliability of the train control and power systems also will be well underway.

The remaining financial challenges include the need for BART and MTC to secure the grants now programmed in support of Resolution 2672. BART issue a third series of sales tax revenue bonds that will contribute another \$129 million to the overall \$1.17 billion renovation program. BART also plans to generate a total of \$123 million in operating funds for direct allocation to the capital program during the period fiscal years 1999 through 2009.

Growing the BART System

BART has experienced an extraordinary period of growth over the past several years. System extensions to Colma, Pittsburg-Bay Point, and Dublin-Pleasanton have added 23 miles of mainline and five new stations. Fiscal year 1998 saw meaningful gains in the implementation and funding of BART's growth program. With respect to

implementation, BART issued three contracts to begin construction of the extension to San Francisco International Airport (SFO) and Millbrae. Site preparation and utility relocation are already well underway. Under a second contract, engineering has begun for the trackway and associated systems. A third contract was issued that will build the BART-Caltrain intermodal station at Millbrae. Also this past year, the Airport contracted for construction of the BART station to be located at the new international terminal. On a dollar value basis, 92% of the contract costs for the extension have already been executed.

On the financial front, a Full Funding Grant Agreement (FFGA) for the Airport-Millbrae extension was secured with the Federal Transit Administration (FTA), virtually guaranteeing the bulk of needed funding for this very large and important project. In addition, BART secured \$57.5 million in State funding to replenish the SFO project contingency.

Challenges for the next year include executing the construction contracts for the San Bruno and South San Francisco stations.

Making BART More Accessible

Since opening its doors for business, BART has been one of the world's most accessible rail systems for all passengers, especially those with disabilities. BART remains committed to improving the accessibility of passengers to the system. Demonstrating its commitment to accessibility improvements, BART has completed several projects were completed to this end in the past year. These include improvements to ten of BART's most troublesome station elevators to increase their reliability. The 19 least reliable station escalators were replaced entirely (four others were replaced in 1996). The elevator at 12th Street Station was replaced with a larger model to comply with current accessibility requirements. Directional signage to assist the disabled has been installed throughout the system.

In the next year, the pace of accessibility-related improvement activities will accelerate. A complete overhaul of all of the elevators and escalators not already replaced will begin. Work will commence to improve and expand accessible parking at numerous stations. The station gates, which enable wheelchair access, will be modified to permit easier, unassisted passage. Many station bathrooms will be remodeled for improved accessibility. Significant new directional and information signage will be added.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized, and an additional category of other financial obligations. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Facilities
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project for which funding cannot yet be identified (Track Two, see below) has been assigned a priority level. Priorities range from a high of 1 to a low of 3. These priorities are determined by three priority categories, as follows: law and regulation; criticality to safety, reliability of service, and/or maintenance operations; and service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted.
- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted,

or introduction of technological advancements which significantly improve operational performance or result in significant cost efficiencies.

- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed; District goals will not be achieved.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the urgency for continued operations, safety, or impact on operating costs.

Funding Availability Status

This *Capital Improvement Program (CIP)* lists all of the projects that the District would implement over a ten year period, if adequate funding were available. The entire program totals almost \$6.7 billion. A program of this size is currently beyond the level of funding that can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks." These tracks group projects by the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects which are essential to continued safe and reliable operation of the system and for which potential funding sources can be identified. Track Two includes projects for which the projected near-term levels of identifiable funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future and/or the creation of new funding sources. See Chapter 3 (Funding Strategy) for more information on funding availability for various programs.

Chapter 2

PROJECT DESCRIPTIONS

Systemwide Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful service lives of the various system components.

Rolling Stock Renovation Program

The purpose of this program of projects is to replace and renovate those components and subsystems of BART's rolling stock that have deteriorated or are susceptible to malfunctions. Aging rolling stock has high associated maintenance costs, reliability problems and is a major factor in service disruptions. Rolling stock renovation will prevent major disruption and delays in revenue service.

Projects Completed

Replace Electrical Couplers on C-1 Cars

The old "pin-type" inter-car electrical couplers were a very high maintenance item. Conversion to "button-type" couplers between cars has reduced maintenance requirements and car out-of-service time.

Replace A- and B-car Door Components

In the past, malfunctions of the door systems on A- and B-cars have been a major factor in service disruptions, and as such were addressed earlier than could have been accomplished through the current car renovation program. One problem was expansion of the foam comprising the door core, which then delaminated the door structures and caused the door to jam. Corroded door suspension rails also contributed to door failures.

Replace Batteries on A, B, and C-1 Cars

The transit vehicle fleet is equipped with batteries to supply power for lights and operating controls for a limited time when the C-car auxiliary power supply equipment or A- and B-car motor alternator loses electricity or fails. Good batteries allow the train to continue to the end of the line after experiencing a motor alternator electricity loss or failure. For reliable service, train car batteries need to be replaced with new batteries every 10 to 13 years. This project has helped to ensure reliable back-up power by replacing 400 aging batteries on A, B, and C-1 cars. In addition, all new batteries have been placed on a time-controlled maintenance and replacement program. Batteries will be reconditioned after 5 years of service and replaced after 10 years.

Projects Currently Underway

A- and B-Car Renovation

The renovation of the District's original fleet of A- and B-Cars is essential to enable BART to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. Before commencement of the Car Renovation Program, the A- and B-Cars had never been overhauled during their 25 year lives. This comprehensive renovation project essentially incorporates all elements of complete reconstruction – it will replace worn out and obsolete components and return the vehicles to their original design specifications. Systems being replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of the cost of new cars.

Future Projects

Track 1

Ten-Year Overhaul of C-1 Cars

The overhaul of C-1 vehicles at the mid-span of their design life will reduce future maintenance costs and greatly improve the reliability of the cars, encouraging additional BART ridership. This project, scheduled to commence in fiscal year 1999, will replace deteriorated floor panels and carpets, recondition car doors, upgrade the vehicle interiors, overhaul the propulsion control equipment and gearboxes, and overhaul and upgrade the air conditioning system.

Track 2

C-1 Car Renovation

The C-1 cars that went into service in the late 1980s will approach 20 years of operation by the end of this planning period. Ideally, these cars should begin a program of complete renovation, similar to that now underway for the A- and B-cars, in the 2008-2009 timeframe.

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically speed recovery from such failures, thereby quickly returning to service temporarily disabled trains. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

Mainline Renovation Program

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline that have deteriorated, or will deteriorate in the next ten years, due to age and use. Many components of the trackway and traction power systems are over 25 years old, are failing with increased frequency. These systems must be reconditioned or replaced in order to maintain reliability and avoid service disruptions. Mainline renovation will prevent rail and traction power failures that would cause disruption and delays to revenue service. The Mainline Renovation projects include:

Projects Completed

Recoat Tunnel Liner Rings for Corrosion Protection

The steel rings that line BART tunnels must periodically undergo heavy maintenance, including removal of corrosion encrustation, sandblasting, and a reapplication of corrosion-resistant coating. This essential work was completed recently in order to avoid further corrosion and consequent structural deterioration and weakness.

Replace Dry with Wet Standpipes

This project replaced dry standpipes with wet (water-filled) standpipes for improved fire-fighting capability and response time to increase passenger safety.

Track Embankment Upgrade

This project permanently enhanced and upgraded approximately 4600 linear feet of track embankment between the Union City and Fremont Stations. The embankment had been damaged by erosion and soil slippage. Improvements included rip-rap (large boulders) and geosynthetic reinforcement to stabilize the embankment and create positive drainage, which will prevent future damage from occurring.

Transbay Tube Cathodic Corrosion Protection

The cathodic protection of the Transbay Tube protects the outer steel liner of the tube from corrosion. This works by forcing current at various locations along the tube into sacrificial anodes that prevent most of the corrosion of the liner. The original anodes lasted only 4 years or so, but with the application of modern applied engineering techniques and materials, the useful lifespan of anodes has been increased to 8 to 10 years.

This project includes several activities associated with cathodic protection that ensure continual and optimal functioning of the system. The anodes and cables for cathodic protection are to be replaced and measurements taken to determine the amount of corrosion occurring. The location and sites of the anodes and the cables are shown on shipping charts; yet, quite often the cables from the anode to the tube are

dragged and damaged by ships dropping anchor. Locating and replacing the Transbay Tube anodes and cables in up to 100 feet of water and 25 feet of mud requires experienced divers and special equipment. In addition, there is cathodic protection on the BART Vent Structure in San Francisco and on the San Francisco Ferry Building for which BART is responsible due to foundation modifications made necessary by the construction of the Transbay Tube.

Projects Currently Underway

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require replacement on a three- to five-year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all the old ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency passenger evacuation and for maintenance crews working in the subway sections. In the past, fan failures have resulted from cracks that have developed over time in the blades, causing the blades to fail. An engineering analysis was conducted on all the ventilation fans throughout the system and it was determined that all the ventilation blades require replacement.

Recoat Structural Girders and Bridges for Corrosion Protection

The BART aerial structural girders and bridges are now undergoing their first complete repainting since their construction in the 1960s and early 1970s. This work is essential to avoid additional corrosion and subsequent structural deterioration and weakness.

Replace Sump Pumps in Subway Tunnels

The sump pumps that keep BART subway tunnels dry are 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keeping the system safe and reliable. This project is replacing 33 aging sump pumps with new submersible-type pumps at 16 different locations system-wide. Also, oil skimmers are being installed at each sump because the effluent is pumped directly to municipal storm drainage systems.

Asbestos Abatement

The 1989 Loma Prieta earthquake damaged the asbestos insulation in train control electronics rooms at various locations around the District. Maintenance personnel can now enter these rooms only when they are fully protected against potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive. This project removes the asbestos-containing material from these areas.

Traction Power Renovation

This long-term program is rehabilitating a wide range of traction power components and subsystems that are aging and deteriorating, leading to lower reliability and higher potential for service disruption. The current traction power system renovation projects are well underway and principally address the District's immediate needs. These critical needs include the strengthening of our third rail coverboards, the removal of asbestos from the 1000 volt breakers, the replacement of unreliable surge suppression equipment, the replacement of worn-out 34.5kV breakers, and the selective replacement of power cables that are undersized or in poor condition. Other individual projects include rectifier reconditioning and the replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, switch enclosures and gas-pressure pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system were identified as being in poor structural condition and are currently under repair. The roofs are constructed of steel decking and, in some cases, are rusting through. Water incursion into substations can result in traction power failures and serious service disruption.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or vandalism. This critical safety project is currently underway.

Future Projects

Track 2

Traction Power Renovation

The traction power system of the original system has been in continuous service for over 25 years. The system's robust design and thorough maintenance programs over these years has enabled this system to serve the District well. We can expect future reliable service if we continue to make judicious investments in renovation in the key elements of this vital system.

The current traction power system renovation projects are well underway and principally address the District's immediate needs. The next phase of renovation would continue to replace equipment that has reached the end of its service life and address the increasing power requirements of closer train headways. The following subprojects are proposed: replace and add transformers/rectifiers at key substations, replace transfer trip system cables, replace 1000 volt DC breakers, add 34.5kV cabling for system redundancy, and add redundancy for station power.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes that attract and consume corrosive elements. These anodes are currently being replaced. The thickness of the steel liner for the Tube is checked every 5 years to confirm that the cathodic protection current continues to provide the corrosion protection expected. The thickness is measured using ultrasonics in core holes cut into the tunnel from the inside up to the steel liner. The core holes are sealed after the measurements have been made. In the continuation of this program, a denser array of core holes will be drilled to provide a more comprehensive picture.

Lake Merritt Channel Subway Repair

The subway just south of the Lake Merritt Station was constructed under the Lake Merritt Channel and has been leaking badly for a long time. Repeated attempts to seal the leaks have only partially mitigated the problem. Salt from brackish water intrusion, picked up and sprayed by passing trains, has caused corrosion in the reinforcing steel that in turn is causing considerable damage to concrete components of the subway. This project will seal the subway to stop water intrusion through the subway walls, top slab and bottom slab, remove damaged concrete, remove corrosion from steel reinforcing bars, and apply new concrete to damaged areas to restore structural elements to their original strengths.

Repaint Steel Girders

The steel girders that were installed in the system's original construction have not been painted in more than 20 years. Inspections have revealed that the original paint has deteriorated with signs of corrosion in the steel surfaces. Funds were allocated for the repainting of these girders and a 3-phase program was implemented. However, nine original bridges were taken out from the last phase so that the more badly corroded John Daly, Junipero Serra and Washington bridge girders, which were installed in the Daly City Turnback Project, could be repainted. A follow-up project is needed to complete the program. This project will remove the original coats of paint and apply new prime and finish coats that will protect the girders against corrosion in the following bridges for the next 30 years: 105th Avenue, Halcyon Avenue, 55th Street, Telegraph Avenue, Hudson Avenue, Pleasant Hill Road, North Main Street, Walnut Creek Channel, and Marine Avenue.

Tunnel Ventilation

In case of a fire within our tunnels, the District maintains a series of fans and other equipment to aid evacuation and suppression of the fire. This program will continue the phased rehabilitation of this equipment started in the Phase I Renovation Program presently underway.

The underground sections of BART have 74 ventilation fans to control the flow of smoke and to provide fresh air for evacuation in the case of an underground fire emergency. In addition, this equipment is routinely run for minor smoke evacuation,

cooling of underground stations and to supply fresh air to our maintenance personnel while working wayside. Our current Renovation Program is replacing fan motors and blades that have been determined by testing to be at, or near, the end of their service lives. This project continues an aggressive on-going program to ensure that this safety critical equipment is reliable and operational at all times.

Another critical aspect of our ventilation design is the rolling steel doors mounted at the east portal of the Berkeley Hills Tunnel. These doors are closed in the case of a fire to ensure that ventilation fans will properly direct the smoke. These doors are 25 years old and in need of replacement. This program will replace these doors.

Station Renovation Program

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. Station Renovation Program projects include:

Projects Completed

Accessible AFC Equipment

This project has brought the BART Automatic Fare Collection ticket vending equipment into compliance with current accessibility requirements. This project added automated voice guidance to the fare-card vending machines and developed a prototype new swing gate to facilitate wheelchair access.

Station Security Program

This project has increased the illumination levels of surface parking lots, added emergency police call boxes in parking lots, and provided decentralized satellite police station structures to accommodate community-based deployment of BART police forces to increase passenger security.

Repair Concrete Roof of Lake Merritt Station

This project repaired the structurally deteriorated concrete roof and replaced the waterproofing material over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof caused water leakage in the south stairway area, making it necessary to close the stairway whenever it rained. Implementation of this repair work has restored the structural integrity of the concrete roof and now provides safe and uninterrupted passenger access between mezzanine and platform levels.

Refurbish and Install In-Storage Faregate Units

The District withdrew 30 faregate units from long-term storage and refurbished them to current standards. They were then installed at various BART locations where additional exit faregates were required due to increasing BART system usage.

Replace Bike Lockers

The original bicycle storage lockers at various BART stations had deteriorated to the point of not providing an acceptable level of security and weather protection, and have been replaced with current state-of-the-art bike lockers.

Projects Currently Underway

Automatic Fare Collection Equipment Modernization / Translink Implementation

The Automatic Fare Collection (AFC) equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore is difficult and costly to maintain. This project will replace all ticket vendors, addfare machines and Cubic faregates, and recondition the IBM faregates. The project needs to be done in order to decrease revenue collection and maintenance costs through the use of more modern servicing modules, increase revenue security and accountability through the use of sealed coin and bill units, implement an upgraded Data Acquisition System, and increase equipment availability for customers. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as the existing equipment approaches the end of its useful service life. An additional need for this project stems from the regional multi-operator Translink "Universal" ticket program that will be integrated with the BART fare equipment.

Near-Term Fixes for Original AFC Equipment

The purpose of this project is to design, procure and install material and equipment to maintain operation of the original Automatic Fare Collection (AFC) equipment until the modernized AFC equipment is available to upgrade or replace the original equipment. The original AFC equipment consists of IBM equipment installed in the early 1970s and Cubic equipment installed in the early 1980s. The original equipment requires obsolete parts that are extremely difficult or impossible to obtain, even from component remanufacturers. Other components of the system are becoming extremely unreliable due to age. Still, other components in the system, such as the IBM addfare logic, are obsolete and cannot handle recent changes in AFC operational requirements (e.g., fare increases, new ticket types). This project is ensuring the District's ability to effectively collect fares.

Credit-Debit Vendors

This project is providing new fare-card vending equipment in a number of high volume stations to permit the sale of high value fare-cards with both credit and debit bank cards.

Replace and Rehabilitate Escalators and Elevators

Other than the escalators at the Embarcadero BART Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads, particularly in the various downtown subway stations. After 25 years of use and wear-and-tear, they are becoming unreliable and uneconomical to maintain and repair on a routine basis. The unreliability of many of these elevators and escalators is a significant source of passenger dissatisfaction. Several of the most unreliable escalators are being replaced, and all of the other escalators and elevators are being completely reconditioned.

Replace Maps and Signs in Stations

This project is updating and replacing outdated maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project is providing a graphic display system that is more flexible and more easily updated than the old maps, which had not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations, and are delaminating from the platforms as well. They are being replaced so that they will remain safe, functional, and in compliance with ADA, while continuing to ensure passenger safety.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment is being renewed in order to protect the safety of patrons, especially during wet weather conditions.

Key Station (ADA) Accessibility Improvements

These projects are providing federally mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for accessible car and van parking. These projects are needed to comply with ADA requirements and to improve passenger comfort and convenience.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the BART system opened 25 years ago. They are becoming increasingly unreliable and uneconomical to maintain. These pumps must be functional and are being replaced as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to lift and creating potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. The sub-surfaces are being reconstructed to allow a stronger bond for the tiles.

General Station Renovation Program

This is a multi-year program to improve the original BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted and retiled as necessary. Weather-protection canopies and windbreaks are being renovated as needed. Repairs are also being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Modify Change Machines

The District's old money changers are more than twenty years old and suffer from mechanical breakdowns and design limitations. This project is redesigning and replacing changer components to provide change to the District's patrons more reliably and efficiently.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards, protect equipment and furnishings, and avoid structural damage, roofing is being replaced at various BART stations.

Replace Bus Transfer Ticket Machines

The bus transfer ticket machines in BART stations are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus services. This project is replacing 100 of these ticket machines. There are two basic types of machines: 65 cashless machines and 35 money-handling machines, which issue San Francisco Municipal Railway (Muni) transfer tickets. Ticket handling machines will be purchased using the same specifications as those for the new BART extension stations. The cash machine specifications will be developed in cooperation with Muni.

MacArthur Station Emergency Exit Upgrade

The District is obligated to ensure that station exiting times are in compliance with the standards cited in the District's 1988 agreement with the California Public Utilities Commission (CPUC). BART had been in compliance until 1995, when platform occupancy loads increased with ridership growth. This project is creating emergency evacuation paths at MacArthur Station, from the end-of-platform gates at the south end of both platforms to the gap breaker station at MacArthur Boulevard, in order to mitigate an existing safety concern. The new evacuation paths are being constructed in accordance with ADA guidelines. Based on computer models created by the BART's Safety Department, the new emergency evacuation paths will ensure compliance with CPUC standards once again.

Replace Lintel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts and lintels that are cracking and deteriorating due to vibration. This project would replace those lintels with a different type of structure less susceptible to vibration damage.

Future Projects

Track 2

General Station Renovation

The appearance of a station directly affects the public's perception of BART, and thus ridership. Maintaining station function and appearance in the long term requires periodic, major maintenance renovations projects. The existing Renovation Program has renovated fourteen of the original thirty-four stations. This new program addresses the remaining twenty stations. The renovation work includes: painting the station interior and exterior; cleaning of trackway; bathroom rehabilitation for ADA compliance; landscaping improvements and energy efficient light fixture replacement; improvements to the station agent's booth and employee facilities; replacement of rolling grill doors; replacement of fire alarm systems; replacement of emergency exit lighting; renovation of drains; and replacement of sanitary, storm and water sewage pumps.

Replace Platform Edge Detectable Warning Treatment at 20 Stations

This project is needed to replace existing edgetiles that have deteriorated over time, and to implement changes in the District's policy for providing platform edge treatments for ADA and Title 24 compliance as recommended by the Accessibility Cross Functional Team and the BART Accessibility Task Force. This project will remove existing edgetiles, prepare surface and provide new detectable platform edge treatments.

MacArthur Station Elevator Replacement

The two elevators in the MacArthur Station are difficult for people with disabilities to access due to the fact that they have to cross a busy roadway to reach them from the station agent's booth and faregates. Also, being remote from the Station Agent, these units are vandalized frequently and are often out of service as a result. These elevators are also susceptible to fare evaders. This project installs new elevators to both platforms within the paid area.

AFC Capacity Expansion

The station capacity study indicated the need for additional automatic fare collection equipment at many core stations. The need for additional equipment will be further exacerbated by the added complexities of credit cards and smart cards to the ticket vending machines. This project addresses these needs through a plan to add automatic fare collection equipment to those stations that require additional equipment

capacity. For planning purposes, the project includes the following additional quantities: 80 ticket vending machines, 40 addfare machines, 100 gate consoles and 40 change making machines. All vault preparation, cabling, installation, manuals, training, project management, DAS changes and parts complements are included. Major stations modifications or rearrangements are not accommodated by this project.

Station Security

Stations in downtown San Francisco, Oakland and Berkeley have experienced increased vandalism and misuse over the past few years. This misuse includes the problem of urination within our elevators and escalators, the primary complaint of the Disabled Community in their recently settled lawsuit with the District. Large multi-level downtown stations are very difficult to police for this type of activity, particularly during late evenings and after revenue service.

This project will replace the present video surveillance system and add security canopies to all station entrances (including elevators). The existing cameras are very limited and do not provide the detail images necessary for prosecution. They also are very limited in number and do not cover areas that have proven to be susceptible to vandalism and other illegal activities. Entrance canopies would secure our stairwells and escalators from vandals and damage during non-revenue hours and would allow certain entrances to be secured early. Entrance security barriers would be added to our street elevator entrance, reducing the vandalism and misuse that occurs during non-revenue hours. Lighting improvements will be added in those areas that are known to have security problems and cameras will be added for additional surveillance. All video surveillance will be transmitted to BART police at both their line offices and Lake Merritt Headquarters.

Replace Stewart-Warner Signheads

The destination signs at 28 of the original stations have been in service for 25 years. They are near or beyond their useful lives, and are increasing in their failure rates and maintenance costs. BART's operation with makes/breaks will require the ability to display different information on each of the signs along a single platform, which is not possible with the existing signs and controls at these original 28 stations.

Resurface Parking Lot Pavement

This project is required to repair surface parking lots, the majority of which have not been treated or resurfaced since originally constructed. Subsurface failures, uneven surfaces, potholes, and general degradation of the wearing surface of the pavement are evident in parking lots throughout the system. This project will repair the subsurface as needed, resurface 24 station parking lots with a two-inch asphaltic concrete overlay, and restripe affected stalls and pavement markings.

Replace Station PA, Platform CCTV, Security CCTV and Yard PA

This four-part project will replace the original public address, closed circuit platform television and yard public address systems that will have outlived their projected useful

lives. In addition, new security cameras will be installed in the core stations that will focus on the AFC equipment. This type of security surveillance is now in service at the five new stations.

Remote Monitoring for Escalators and Elevators at Extensions Stations

The present escalator renovation project includes installation of a remote monitoring system. This system will provide a central monitoring station inside BART Central Operations and at the Oakland Shops. Whenever any escalator or elevator stops functioning, a message will be sent to both monitoring stations and will identify the cause of stoppage. The remote monitoring provides immediate and automatic notification to Central and Maintenance of any escalator or elevator stoppage. This eliminates the delay of notification from the Station Agent and also provides more accurate information of the cause of the problem. With accurate information, maintenance crews can be better prepared to correct the problem when dispatched. This project will connect the extension stations to the remote monitoring system installed in the escalator and elevator renovation projects.

Station Reroofing

The present renovation program will reroof seven of the twenty-two roofed core stations. This project will continue this program to complete the remaining fifteen stations. All roof insulation and flashing will be replaced by this project.

Replacement or Renovation of Garage and Other Elevators

Many of the Districts non-station elevators are at, or near, the end of their service lives. This program would evaluate each elevator unit to determine if it should be replaced or renovated, similar to our present renovation program of our station elevators. This program would include our main office building units, parking structures, and shop buildings. Many of these elevator units are over 25 years old and replacement parts are becoming more difficult to obtain.

Controls & Communications Renovation Program

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. Controls & Communications Renovation projects include:

Projects Completed

Replace Maintenance Vehicle Detection Devices

This project replaced the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These essential vehicle detection devices allow Central Control to observe the location of on-track maintenance vehicles. They also serve as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The new units replaced those which had been in service for over 24 years and which had been experiencing increasingly higher failure rates. When a failure occurred, the high-rail maintenance vehicle had to be removed from the mainline track, per the requirements of the California Public Utilities Commission, resulting in non-productive time in maintenance work schedules and the need for single tracking.

Reverse Running In Transbay Tube

In the past, older train control electronics restricted reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification to train control electronics provided the necessary signaling to allow up to three trains to run simultaneously in the Transbay Tube.

Projects Currently Underway

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems being replaced are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project was needed to replace the 25-year-old computers running the DAS and DSS systems and the 15-year-old CCS computers.

Fiber Optic/ Radio Telecommunications Network (TRACS)

This project is furnishing and installing a systemwide fiber-optic and multi-frequency trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The old radio system had several significant shortcomings, both in terms of capacity and reliability, which had frequent negative operational impacts and occasionally would affect passenger safety. This

project is being implemented through an innovative joint development program, with significant long-term revenue potential.

Advanced Automatic Train Control (AATC)

BART is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project will allow system throughput to increase from the current 21 trains per hour up to 30 trains per hour. The system will be installed over the existing control equipment with relative ease and no service disruptions. AATC will permit more accurate monitoring of train location, allow reduced run times and, thereby, increase the efficiency of the vehicle fleet. The project will help BART to meet the increased demands on the system, as headway reductions become necessary in the future, as well as displace significant needs for train control renovation.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Wayside Train Control Renovation

This is a long-term program to replace vital train control components and subsystems that are becoming unreliable due to age, and difficult to maintain due to obsolescence. Many of these components are no longer being produced or supported by the original manufacturers. If this work is not completed in a timely manner, essential train control hardware failures could lead to extensive service disruptions. This program is also replacing the Sequential Occupancy Release System (SORS). SORS is a back-up safety system required by the California Public Utilities Commission to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the main train control system. The original primary SORS computer is 25 years old, obsolete, and becoming difficult to maintain. This safety-critical system must remain operational and reliable.

Replace MARIS

This project replaced the District's 25-year-old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Second Communications Specialist Workstation in Central Control

As the new BART Extensions become operational and the number of trains on-line increases, it is necessary to create a second communications workstation from which BART communications specialists in Central Control can make essential announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MetroVision Sign Units

This project replaces the MetroVision sign units in the downtown San Francisco and Oakland BART stations. These units, which display train destination and general BART information, along with commercial advertising and public service messages, are being replaced with the same type of updated dot-matrix sign units as those that are now used in the new BART Extension stations.

Future Projects

Track 2

Installation of Advanced Automatic Train Control on Remainder of the Core System (A/R/C/K Lines)

The BART Train Control Vision team has approved the AATC concept as the replacement for the Westinghouse track circuit based train detection and speed command train control system. The existing BART train detection and speed command train control system is 30 years old. The system has aged beyond its design life and the equipment has been out of manufacture for 25 years. As the system has aged, spare part stocks have been seriously depleted. It is increasingly difficult to obtain replacement spare parts and to maintain existing service levels. The Westinghouse train control system needs rehabilitation just to keep today's level of service. As designed and installed, the Westinghouse system cannot meet the service requirements for 10 year plan ridership projections.

In keeping with the long range vision of the Train Control Vision Team, the car borne Automatic Train Control (ATC) will need to be replaced. The cost of replacing the vehicle ATC can be minimized by coordinating the replacement of the car borne ATC with the implementation of AATC systemwide. This project is the next step in that vision. Presently the car borne ATC has specialized electronics required to detect track signals from the Westinghouse wayside train control equipment. The AATC system does not require these electronics. Consequently, the cost of car borne ATC replacement can be minimized. The AATC system has one third the components of the Westinghouse system and therefore will be significantly less costly to maintain.

Installation of AATC Complementary Technology, Broken Rail Detection and Silent Train Detection

The AATC system cannot detect vehicles that are "silent" to the AATC radio system. Additional development to the AATC system needs to occur to permit the detection of "silent" vehicles. Since AATC is a radio based system, AATC cannot detect the condition of the rail. As AATC is presently being implemented, detection of these conditions will be provided by the track circuit based Westinghouse train detection system. Unfortunately, the Westinghouse system is beyond its design life and needs replacing. In order to replace the Westinghouse train control system and allow AATC to

become a stand alone system, the AATC system needs to be augmented with silent train detection and broken rail detection.

Installation of AATC Complementary Technology, Program Stop

The automatic operation of berthing a train at a passenger station is called program stop. Presently the program stop is accomplished by coordination of the wayside Westinghouse train control system and the car borne train control system. To fully replace the Westinghouse train control system, this function needs to be incorporated into the AATC system.

Central Computer System Software Development to Support AATC

The current Central Computer System (CCS) software was developed with the constraints of the Westinghouse train control equipment and therefore has a limited ability to control the movement of the trains. In contrast, the AATC system exerts very fine control over train movement. AATC can also determine the location of trains on the BART mainline to within 30 feet. In order for the Operations Center to effectively operate the AATC based train control system, the CCS core train management logic and computer displays in the current CCS software must be restructured.

Replace Original DTS Data Communications System Equipment at 44 Locations

BART is a highly automated mass transit system. A complex set of remote and central computer systems monitors many support functions, including train operations. To best manage this distributed system, it is necessary to continuously monitor and control this equipment automatically. The overall supervision of this system is performed in BART's Operations Control Center (OCC), where OCC staff receive data from every BART station control point. The original data communication system, called the Digital Transmission System (DTS), is the key means to bring this data to the OCC. The DTS provides digital communications between the central computer system (CCS) at Lake Merritt and all original BART passenger stations, yards, the Transbay Tube, and the Berkeley Hills tunnel. The DTS is part of the first-generation BART equipment and 25 years later represents a system that is difficult to maintain, lacks sufficient spare parts, and has some components that cannot be replaced with modern components.

With the construction of BART's new extension stations, the DTS was replaced with the Supervisor Control & Data Acquisition System (SCADA). This system represents the new technology standard that will serve the District well into the next millennium. This project will replace the District's original data communications system with the new SCADA system at 44 locations within the original BART system.

Replacement of Interlocking Relay-based Logic with Microprocessor-based Logic

The existing interlocking relay-based logic controllers, a critical element of the train control system, are 30 years old. Most of the relay equipment is no longer manufactured. The industry is moving to microprocessor-based controllers.

Consequently obtaining interlocking type relays is increasingly difficult. Lead time for procurement is now a minimum of 20 weeks. The existing relay plant has aged to the point where the relays are physically deteriorating. Relay logic controllers will need to be refurbished or replaced. To improve the service operations, the relay-based logic controllers have been expanded over time and presently are at capacity. Future expansion of the existing relay logic controllers is very difficult and expensive. Replacement of the relay-based logic with microprocessor-based logic will resolve the capacity issues of space, power, and logic size.

Replace Operating System Computer Hardware

The high performance computers necessary to run our operating systems will become more difficult to maintain as they become older and technology changes. The main operating computers should therefore be replaced every seven to ten years to ensure that these critical systems for operation of our trains and data collection systems are reliable and maintainable. This cycle necessitates that the District plan well in advance to ensure that a seamless transition to new computing equipment can take place before serious system disruptions occur.

The operating computer system controls and supervises many of the key operating systems of the District. These include: Operation Control Center (OCC), Data Acquisition System (DAS), Destination Sign System (DSS) and our station computers for line functions such as the interface from credit/debit vendors to our bank for ticket purchases. All of these systems have been incorporated in the current Track One NXTgen projects that will be completed soon. The NXTgen program was designed with an "open system" architecture that will facilitate the future hardware renewals that this program proposes. This program will utilize the benefits of the software "open system" to purchase new computers to serve the District's ever-increasing computing needs.

Wayside Wiring for Interlocking - Replace Underground

By the time this project is scheduled, the wayside wiring will be 45 years old. The design life of the wire, however, is estimated at 40 years. This project will replace the interlocking power and control wiring from the switch machine to wayside junction boxes. All such wiring on the core BART system would be replaced in coordination with the replacement of wooden ties at interlockings.

Replace District Telephone Systems

This project will replace all of the District telephone systems. This includes the nineteen PABX switches at LMA, MSQ, 1330 Broadway, 1000 Broadway, 25 Fourth Street, all of the Extension stations, the line offices and all of the telephone instruments connected thereto. Certain portions of the telephone cable plant will also need to be replaced. PABX software will be required to meet the increased demands of operations.

As the equipment ages, spare parts will no longer be manufactured for much of this old equipment, making it very difficult and costly to maintain. In addition, many enhanced communication functions will be required which the present equipment does not provide. These capabilities will include voice/data integration, digital internet access

and video conferencing support among others. This project will utilize the fiber optic "back-bone" being installed in the Track One program.

Richmond and Daly City Yard Console Replacement

The control console in the Richmond tower is 30 years old. The equipment is obsolete and difficult to maintain. The Daly City console is 10 years old and supporting electronics have been heavily modified to support the Colma expansion. In addition, the Daly City equipment is obsolete and spare parts are an issue. All this equipment is vital for the day to day operation of the yards and continued performance needed to meet the requirements of yard operations.

AVI Readers at Yards and Other Locations

BART performs revenue vehicle tracking and accounting via manual systems for cars in yards, and via MARIS for cars on the mainline. These systems do not provide for data exchange between them and as a consequence often contain incomplete or incorrect information. This affects efficient operation of the yards including locating cars needing maintenance and repair. This project would include the procurement and installation of new Automatic Vehicle Identification (AVI) scanners and the installation of wiring and interfaces between Yard Control Systems and MARIS.

Network Equipment Replacement: Administration/Operational Networks

There is an ever increasing need for additional information based services at the desktop of District personnel. For example, interaction with other agencies, contractors, suppliers, etc. is required at an accelerating rate. The architecture of the present office network will be unable to support these requirements including the requirement for much faster speeds. In addition, spare parts will no longer be available for this equipment. Parts for networking equipment are typically stocked for about a five year period at best.

This project will replace all the District data networking equipment. This includes approximately 40 network hubs which have been in service for many years to support the personal computers in most District offices, as well as those which support approximately 60 operational locations, such as station agent booths, radio transmitters, AFC equipment, destination signs, train control equipment, etc. Much of the cabling for the office computer network will need to be replaced as well.

Facility Renovation and Replacement Program

The purpose of this program of projects is to address the deterioration of the shops and yards due to 25 years of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. Some of these projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance, by reducing vehicle out-of-service time, and by keeping as many vehicles in service as possible. These projects will improve the safety of the shops and yards, provide cost savings to the District by reducing maintenance turn-around time, eliminate travel time to and from vendors and improve the efficiency of the shops and yards by providing employees with dependable equipment. Facility Renovation projects include:

Projects Completed

Fire Main Replacement at Hayward Yard

Two fire mains had to be removed due to leaks and a subsequent increase in surface water buildup. The leaking was becoming a safety hazard and posed a serious threat to the building foundations. One of the fire mains was located beneath the shop apron slab and was replaced with an overhead pipe. This project also installed a new fire main beginning at a new street tie-in. The new main was connected to the new overhead pipe through the center of the shop to feed the existing fire protection system.

Wheel Truing Machines

This project replaced a 25-year-old wheel truing machine in the Hayward Shop. A new, second wheel truing machine was also installed at the Richmond Shop. The new, more reliable and higher capacity truing machines allow the District to go to a higher standard of preventive maintenance for wheel profiles, increase productivity, and result in lower load factors since fewer cars are being held out-of-service waiting for wheel re-profiling.

Yard Fuel Tanks

This project installed 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement that has eliminated the need to bring maintenance vehicles from these outlying yards into the Oakland Yard to refuel.

Yard Efficiency Improvements

This project reconfigured trackwork at the Richmond Shop to improve staging and routing of cars.

Projects Currently Underway

Hayward Shop Traction Motor Repair Facility

This project is renovating the Hayward shop and replacing old shop maintenance equipment. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars are held out of service for repairs.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow-pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants as well as renovating the shop's heating and cooling systems.

Employee Facilities Improvements

Prior to this year, the infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building had not changed substantially since the BART system opened. This project is providing basic essential reconditioning and remodeling as needed to create acceptable work environments.

Overhaul Transit Vehicle Washers

Until recently, the facilities used to wash the exterior of transit vehicles were still the original system installations. They were becoming increasingly inefficient, and did not comply with current standards for containment and treatment of chemical-laden waste water. This project is bringing the vehicle washers back up to full operations, and also providing waste water controls.

Richmond Yard Security Enhancement

Richmond employees have become increasingly concerned with their safety while working in the Richmond shop and yard. Although no District employees have been targeted, stray bullets have hit several buildings. This project will enhance personnel safety by improving specific features at the Richmond Yard Facility, including the entry gates, access roads, fencing, and lighting.

Reconfigure and Renovate Transportation Buildings

These buildings, located at the train dispatch yards, provide the essential administrative facilities for on-site train operations, as well as lunch/break rooms, locker rooms, and other support facilities for on-duty train operators. These buildings are being reconfigured to serve the increased number of operators required to provide the higher service levels associated with the new system extensions. At the same time, the existing structures are being reconditioned and remodeled as necessary.

MetroCenter Building Fuel Tank

The old 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is

no longer in compliance with regulations for underground fuel storage. BART is replacing the tank.

Replace Parts-Washing Facilities in All Shops

This project is replacing parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities, if found not to be in compliance.

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all high-value repairable parts in support of transit vehicles, station and field equipment, and automatic fare collection equipment. Failure to provide for these requirements could lead to vehicles being out-of-service and disruption in maintenance and service operations. This on-going need must be funded annually.

Future Projects

Track 1

Replace Roofing on Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as they deteriorate due to age and exposure.

Track 2

Additional Storage Facilities (includes central stores warehouse)

The District is facing an increased need for inventory of materials as the new system extensions are coming on-line, the size of the operating fleet increases, and parts are stocked for A- and B-cars as configured both before and after renovation. A new, modern central receiving and distribution warehouse facility would meet these storage needs.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lifting units must be ensured through periodic reconditioning.

Additional Storage Facilities

Serious deficiencies currently exist in all storage facilities. The Inventory and Stores Division currently utilizes a combination of District-owned and rental space for the storage and distribution of inventory materials. Storage space shortages will be more severe as inventory for expanded operation comes online. An assessment by staff

indicates a significant increase in stock-keeping units (SKUs), both consumable and repairable, over the next few years, plus additional storage needs further down the line. This project will construct and/or acquire a centralized storage and physical distribution center. The facility will be built to accommodate the repair shops and storage needs through 2010.

Reroofing at the Shops and other District Facilities

Some District buildings, such as the Shops, still have their original roofing systems that are in poor condition. Typically, the original roofing systems have numerous bubbles and are brittle. These conditions indicate loss of adhesion between plies caused by water intrusion. Furthermore, most of the flashings are blistered and cracked. Some areas of the roofs feel spongy while some areas are depressed. These conditions indicate wet or deteriorated roof insulation. This project will remove roofing, insulation and flashing at all revenue vehicle shops, non-revenue vehicle shops and maintenance shops throughout the District, and replace them with roofing systems that are guaranteed for 15 years.

Overhead Cranes Renovation at Shops

The overhead bridge cranes in the four shops are over 25 years old, and many of their major components are near the end of their service lives. In addition, they do not meet new seismic requirements for heavy duty cranes. This equipment is used on a daily basis in the repair and maintenance of our fleet. The age of the equipment has made it difficult to find replacement parts, and the equipment does not include current safety devices to protect our employees. This project will renovate these cranes with modern components that will improve crane reliability, safety, and performance.

Car Wash Facility at Richmond and Hayward

The present car washers are not operating effectively as they are old and failing. In the present program, we have started to modify the Concord Car Wash to develop specifications by defining the best combination of chemicals and equipment to achieve the best results. When testing and installation at Concord is completed, this project will replace the washers at Richmond and Hayward with the new system.

Work Equipment Program

The purpose of this program is to replace worn and obsolete maintenance vehicles, service vehicles, and maintenance equipment. The equipment includes such items as tools, power generator sets, light towers, ground and building maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police vehicles, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from frequent use. Eventually, it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program ensures that old, worn out equipment is replaced regularly to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by BART, but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Projects Completed

Castro Valley and Dublin/Pleasanton

This project, which opened in May 1997, is a 13.8-mile double-track, new branch line extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project at Dublin-Pleasanton. Currently, there are two stations on this extension: one in Castro Valley located at I-580 and Redwood Road, and a second station in East Dublin-Pleasanton near Hacienda Business Park. A third station at West Dublin-Pleasanton near Stoneridge Mall will be added when funding has been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8-mile double-track extension, having two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements were made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point opened in December 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

Colma

The Colma Extension, which opened in February 1996, added a new station, parking garage, and bus transfer facility approximately one mile past the Daly City Station. This project has relieved access and traffic circulation problems at the Daly City Station and has provided additional BART system access via I-280 and Route 1. It is also the first leg of the extension to San Francisco International Airport, which is now under construction.

Projects Currently Underway

San Francisco Airport

The San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at South San Francisco, San Bruno, and Millbrae. When completed, this extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient intermodal transportation link between BART, Caltrain, West Bay communities, and East Bay communities.

Future Projects

Track 1

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District. Regional funding commitments have been secured for a portion of the cost of this project. On this basis, this project has been listed here in Track 1. The remaining, unfunded balance is in Track 2.

Oakland Airport Connector

The Oakland Airport Connector Project would directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project. Other technologies and funding sources are also being evaluated. Funding for environmental assessment and preliminary engineering has been secured. On this basis, this project has been listed here in Track 1. The remaining, unfunded balance is in Track 2.

Track 2

West Dublin-Pleasanton Station

The Dublin-Pleasanton Extension currently includes two stations: one in Castro Valley and a second station in East Dublin-Pleasanton near Hacienda Business Park. Although both of these stations opened in May 1997, the East Dublin-Pleasanton Station is already so heavily utilized that the parking lot is full by mid- morning. Also, for many commuters living in the Dublin-Pleasanton area, this station is in the opposite direction from their homes to their workplaces. The original plans for the Extension therefore called for a third station at West Dublin-Pleasanton near Stoneridge Mall.

In June 1998, BART issued a Request for Proposals for the joint development of the West Dublin station and adjacent real estate. The responses to the Request are currently being evaluated. The mix of uses planned for the project site will be dependent upon the developer selected and the outcome of financial analyses of the different development opportunities. However, the project would include parking, a bus transfer facility, and one or more of the following: office space, a hotel, residential units, retail space. The joint development of both the West Dublin Station and adjacent land will enable BART to construct the station much earlier than otherwise possible by substantially reducing the amount of public funding required to build the station and by providing services and amenities accessible to BART riders.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with these communities, and will pursue funding for further planning and development of these projects. However, funding constraints indicate that their implementation will not be likely within the timeframe of this current BART capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors relatively soon is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area.

Seismic Retrofit Program

The recent earthquakes of Loma Prieta in 1989, Northridge in 1994, and Kobe in 1995 have caused seismic engineers and geologists to re-evaluate design codes, particularly in areas where structures are very close to a fault. The Hayward Fault is of great concern because of its close proximity to the District's Dublin-Pleasanton, Richmond and Pittsburg / Bay Point lines. Seismic experts have estimated a one in four chance of a major earthquake of a magnitude 7.0 or greater at a location on the Hayward Fault within the next 30 years. An earthquake of this magnitude has the potential to cause serious damage to our structures. The damage caused by such an earthquake could require significant repair and replacement of components of the system.

While our original designers utilized seismic design standards that greatly exceeded standards of the time, new understanding of seismic ground movements combined with computer analysis tools have changed the way engineers design for earthquakes today. BART structures, when examined using today's criteria, require a retrofit upgrade program to ensure their performance through a major seismic event. This program addresses the single pier viaduct structures, which are likely to be most vulnerable in an earthquake, in addition to other trackway structures, stations and buildings of the District.

In addition, the seismic joints of the Transbay Tube, located at each end of the Tube, require re-adjustment. These joints were designed to permit independent movement, but from settlement over time and the Loma Prieta Earthquake, have lost some of their capabilities to move and adjust in a major earthquake. This program would restore their capability to nearly the original range of free movement.

Finally, structures such as aerial and underground stations, concrete tunnels, and District buildings and shops need to be analyzed with respect to seismic safety. The Track 1 Seismic Retrofit Program would perform this detailed analysis and define a Track 2 program to address these structures.

The program is to be implemented in three phases over a period of seven to nine years:

- Phase I

The Phase I lifeline retrofit will retrofit aerial structures from the Coliseum station to the Oakland Wye, from the west portal of the Berkeley Hills Tunnel to the Wye, from Ashby station to MacArthur station, and from the Wye to Colma station. This phase also includes the work required to adjust the seismic joints in the Transbay Tube. The objective of Phase I is to ensure a core system of operation with turnbacks for each trunk and access to the Oakland and Daly City shops. In addition, Phase I includes a

systemwide seismic safety study that will identify the critical seismic retrofit needs of the BART system.

- Phase II

Phase II projects will retrofit the aerial structures from the Coliseum station to South Hayward station, adding direct access to the Hayward yard and connecting the Dublin-Pleasanton Line to the system.

- Phase III

Phase III will retrofit the remaining single pier trackway structures south of Hayward Yard (Dublin-Pleasanton line), north of Berkeley (Richmond line), and north of Orinda (Pittsburg / Bay Point line). In addition, Phase III will retrofit those stations, facilities and other structures deemed to be seismically at risk by a systemwide seismic safety study.

Track 1

Caltrans Engineering Study

This Caltrans-sponsored engineering study will identify those BART structures the seismic-triggered collapse of which would put Caltrans infrastructure at risk and to estimate the cost of seismically retrofitting such structures.

Lifeline Corridor

This Caltrans-sponsored project will implement the seismic improvements to the BART structures identified by the engineering study.

Systemwide Seismic Safety Study

This project will study the seismic safety of the entire BART system in the event of a maximum credible earthquake. The study will define seismic retrofit projects and rank such projects by risk.

Seismically Retrofit Seismic Joints of Transbay Tube and W. Oakland Station

This project will restore and/or increase the designed movement capacity of the joints thereby lessening the possibility of joint failure. Joint failure will cause flooding in the tube and endanger the lives of passengers.

Seismically Retrofit Aerial Structures from Transbay Tube to W. Oakland Station

This project will strengthen the aerial structures of this lifeline corridor segment of the BART system that provides safe passage to West Oakland Station for emergency evacuation if necessary during an earthquake. This segment in particular requires strengthening, because the aerial structures are founded on spread footings on weak soil that is prone to failure during earthquakes.

Seismically Retrofit Aerial Structures from Oakland Wye to W. Oakland Station

This project will strengthen the aerial structures of this lifeline corridor segment of the BART system that provides safe passage to West Oakland Station for emergency evacuation if necessary during an earthquake. This segment in particular requires strengthening, because the aerial structures are founded on spread footings on weak soil that is prone to failure during earthquakes.

Track 2

The remainder of the Seismic Retrofit Program (a portion of Phase I and Phases II-III) is currently listed in Track 2. The Track 2 portion of the program will be defined more explicitly when the results of the systemwide seismic risk study are known. The following project is defined, but no funding has yet been secured for the project.

Upgrade Seismic Sensors and Install Gas Shut-off Valves

Scattered around the District are a few existing seismic sensors, which are beyond the end of their useful lives. These seismic sensors are also, by today's standards, very basic in that they cannot provide much information on the type of movements that have occurred. This program would install sensors capable of providing immediate information that would be vital in post-earthquake operational evaluations and facilities inspections.

The major cause of fires following an earthquake is ruptured gas lines. Today seismic shut-off valves are available which can shut off gas flow when a significant earthquake occurs, or when there is a sudden loss of pressure in the building or shop. This project will install these safety devices as needed throughout the District.

Service Improvements Program

The purpose of this program of projects is to improve passenger services and system capacity at BART stations and shops by building intermodal transit centers, bicycle facilities, and other passenger service, system capacity, and station area improvements. For all of the following projects, BART is or may be the official sponsor. Additional station area development projects for which BART is working with local and regional jurisdictions, but is not the official sponsor, are listed in the section of this chapter titled Station Area Development.

Projects Completed

Hayward, Bay Fair, Concord, Walnut Creek, and Daly City Transit Centers

All of these projects are now operational. They improve traffic circulation in the vicinity of the stations, and improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities.

Anti-Graffiti/Vandalism Task Force

This project utilized increased public awareness, plainclothes police enforcement, CCTV-VCR surveillance systems, and inter-agency cooperation to combat graffiti and vandalism systemwide.

Projects Currently Underway

Additional Transit Centers

BART and AC Transit have entered into a Memorandum of Understanding in which AC Transit will pass federal Section 9 funds through to BART to fund construction of transit centers at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations.

Fruitvale Transit Village (Childcare Facility and Pedestrian Plaza)

BART is working with the Spanish Speaking Unity Council (SSUC) on two components of the Fruitvale Transit Village: the childcare facility and the pedestrian plaza. The childcare facility will accommodate approximately 200 children and will enhance and encourage the use of public transit at the Fruitvale Station by providing a service to patrons of both BART and AC transit. The plaza will consist of a 20-25,000 square foot public pedestrian plaza on the current site of a BART parking lot on the east side of the Fruitvale station. The City of Oakland is securing state funds to build a structure for replacement parking. The pedestrian plaza will visually enhance the Fruitvale Station, provide a pedestrian link from the Fruitvale station area to planned and existing jobs and services, and improve pedestrian access to BART and AC Transit. Surrounding the pedestrian plaza site, the SSUC will construct a transit-

oriented project that will feature community facilities and services, including the childcare facility, a community resource center, a health clinic, and a senior center. The project as a whole is also intended to leverage private investment in the development of retail and offices.

Shop Upgrade and Expansion

The increasing size of the operating fleet requires that BART's heavy maintenance facilities be reconfigured, renovated and expanded in order to increase shop efficiency to a level adequate enough to properly maintain the expanded fleet. This expansion is also essential to reduce the amount of time cars are held out of service for maintenance and repairs.

Future Projects

Track 1

Bike Program

This project would improve bike access to BART by providing day-use bike lockers and other bicycle parking facilities at BART stations.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Dublin-Pleasanton Station Parking Expansion

This project would expand the existing parking lot at the Dublin-Pleasanton station by adding 900 parking spaces. To complete this project, the District will acquire, clear and surface land for a surface parking lot.

Pittsburg / Bay Point Station Parking Expansion

This project would expand the existing parking lot at the Pittsburg / Bay Point station by adding approximately 500 parking spaces. To complete this project, the District will acquire, grade and pave land for a surface parking lot.

Track 2

Oakland Coliseum Access and Station Area Improvements

This project would create a multi-modal transportation hub to facilitate transfers and access to services for users of BART, AC Transit, private shuttle buses, the proposed BART/Oakland Airport Connector, Capitol Corridor rail service, the Oakland Coliseum Complex, and the surrounding commercial and residential developments. It would

include improvements to the pedestrian bridge which links BART, the Coliseum, the planned Capitol Corridor rail station, and the proposed Airport Connector; accessibility improvements; bus intermodal improvements; improved vertical circulation and other BART station modifications; and security improvements.

West Oakland Access and Station Area Improvements

With the recent completion of the Cypress Freeway in West Oakland, an opportunity exists to examine West Oakland BART Station access improvements. The Union Pacific Railroad Company has placed property on the market that, if acquired, could provide access improvements and development opportunities for the BART station. Acorn, a non-profit affordable housing provider, has expressed interest in developing housing adjacent to the West Oakland BART station, and the Oakland Housing Authority is supportive of this prospect. Before any development or access improvements can proceed, a number of planning activities would first need to be undertaken to ensure community support for any improvements and to assess the costs and financial feasibility of various improvements.

Balboa Park Station Area Improvements

This project would be primarily concerned with pedestrian safety and circulation at the Balboa Park BART Station. The areas to be addressed include Bart-Muni connections, pedestrian and bicycle paths to City College and surrounding neighborhoods, bicycle parking facilities at the station, taxi/paratransit waiting areas, automobile/vanpool pick-up/drop-off areas, trees and other landscaping, sidewalk-level lighting, police surveillance and station area land uses that improve visibility and provide "eyes on the street".

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate anticipated patronage growth. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate substantial growth. The Additional Capacity Enhancement subprogram is conceptual and still under development, but could include additional transit vehicles, additional traction power and train control renovation and upgrades, other reliability improvements, station circulation and access improvements and maintenance facilities expansion. The cost listed for this subprogram is a preliminary estimate.

Station Area Development in Partnership with Local Communities

For the following projects, BART staff is working with local and regional jurisdictions to facilitate station area development. BART is not the official sponsor of any of these projects. Station area development projects for which BART is or may be the official sponsor are listed in the Service Improvements Program section of this chapter.

Station Area Development

BART staff is working with various communities and private developers to facilitate the creation of transit-oriented development at certain stations. Such development is intended to improve pedestrian access to stations and provide services, jobs, and housing within easy walking distance of stations. Such development would attract more patrons to BART, including off-peak riders and reverse commuters. BART staff is currently working with local jurisdictions on various station area studies to promote transit-oriented development or physically improve livability, vitality and pedestrian access at and around the following BART stations: Union City, Bay Fair, San Leandro, Coliseum, Concord, Pleasant Hill, and El Cerrito Del Norte Plaza. BART is also working with communities to create specific plans for transit-oriented development at the Pittsburg/Bay Point and Millbrae stations.

In addition to its planning activities, BART is in the process of securing developers for the West Dublin/Pleasanton, MacArthur and Richmond Stations. Local jurisdictions are working closely with BART on development at two other stations. At the Hayward Station, the City is negotiating a land swap with BART to facilitate the construction of housing as a supplement to previous station area development. At the Ashby Station, the City of Berkeley holds the air rights over the station parking lot, so BART staff is working with the City and the City's selected developer to pursue a development project. Finally, two station area development projects are past the planning and solicitation phases. The first, the Fruitvale Transit Village project, is nearly ready for construction. The other is located at the El Cerrito Del Norte Station, where BART has entered into an Exclusive Negotiating Agreement with a housing developer.

Mission Street Corridor Revitalization Project

The plazas at the 16th Street/Mission and 24th Street/Mission Stations function as important transfer centers for passengers connecting between BART and Muni. Over the years, however, the plazas above the stations have become a source of neighborhood concern over such issues as security, aesthetics, and public amenity. In response to this concern, BART and the Metropolitan Transportation Commission (MTC) have sponsored a series of community workshops focused on the two 16th Street/Mission plazas and led by Urban Ecology, an environmental advocacy organization, and Mission Housing, a local developer of affordable housing. The product of these workshops is the Community Design Plan, which establishes a

blueprint for creating a safer and more active and vibrant public space at the 16th Street/Mission Station. The plan calls for additional trees and benches, new bus shelters, a more formal entryway to BART, and other amenities.

The San Francisco County Transportation Authority (SFCTA) has expressed interest in developing design plans for both the 16th Street/Mission and 24th Street/Mission Stations concurrently. This will ensure that common elements on the plazas of both BART stations are developed in a consistent manner, helping to establish a strong identity for the Mission Street corridor, and reducing overall design costs. SFCTA is sponsoring this project in partnership with BART, MTC, MHDC, and the Mission Economic Development Association (MEDA).

Lafayette Station Access and Station Area Improvements

During the past year, the City of Lafayette has worked with developers on plans for a \$30 million transit village project just south of the Lafayette Station that will include retail, 75 apartments and an office or hotel building. The new development will be entirely accessible to persons with disabilities, and the City will require the developer to provide facilities beyond those required by current law, including elevator access to each floor of the apartment units and "chirping" pedestrian signals. However, the southern access to the Lafayette BART station is not accessible to people with disabilities. The proposed capital project, to be sponsored by the City in partnership with BART, calls for the construction of a ramp and an accessible pathway leading from the south side of the BART station into the development.

Research, Development & Demonstration

Projects Currently Underway

Electric Station Cars

The District is conducting a demonstration program and has purchased 45 electric cars that are being used by BART and PG&E employees for access to and egress from stations. The project is demonstrating that "station cars" can enable transit to provide entirely electric door-to-door service that will attract new patronage.

Superconducting Magnetic Energy Storage (SMES)

Two related projects are studying the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains with tighter headways to support projected future service levels. Multiple approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations and high temperature superconducting materials.

Chapter 3

FUNDING STRATEGY

BART's *Capital Improvement Program (CIP)* includes all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$6.208 billion. Of this total, the Track One program at a cost of \$4.225 billion is comprised of those projects for which potential sources of funding can be identified. The \$1.983 billion balance of the program, Track Two, serves as the basis of advocacy for increased levels of capital funding.

Track One is divided into two phases. Phase 1 is composed of those projects included in the District's original \$1.1 billion renovation program, as outlined in fiscal year 1993. Phase 2 is composed of those projects *outside of the original renovation program* for which potential funding opportunities have arisen in large part due to the passage of the Federal Transportation Equity Act for the 21st Century (TEA-21). Most of these projects were listed in Track Two before such potential funding opportunities were identified by BART. The opportunity to advance these projects is driven by additional available grant funding in the region and the funding criteria utilized to award such funding to projects.

A summary of BART's Track One funding needs is provided in Table 1. A summary of the proposed funding sources for BART's Track One projects is provided in Table 2. Further funding need detail on all Track One and Track Two projects is outlined in Chapter 4.

Systemwide Renovation Program

For 20 years after the inception of rail service in 1972, BART was considered new and state-of-the-art. Reliability improved steadily even as service levels increased. By the early 1990's, however, the effects of aging began to show up. It became apparent that stations, rail cars, and the basic system infrastructure would soon need more than just routine maintenance to continue operating reliably at increasingly higher levels of service. In 1993, BART evaluated the condition of the physical plant and developed a \$1.1 billion initial phase program of renovation projects needed to return the system to near-original design standards.

In 1994, as the magnitude of the program became known, BART and the Metropolitan Transportation Commission (MTC) began discussions on how to fund this initial program of critical renovation needs, resulting in joint adoption of MTC Resolution 2672. The CIP that BART adopted in January 1995 outlined a set of projects and a funding strategy to implement a multi-year program of rebuilding, for which Resolution 2672 and a series of planned BART bond issues formed the foundation of the program at a \$650 million funding level. Other grants and BART funds are anticipated to fund the remainder of the need.

Generation of Grant Funds

In May 1994, BART and MTC jointly adopted a cooperative funding agreement (MTC Resolution 2672) to address BART's most critical renovation needs. The agreement calls for MTC to program \$450 million in federal, state, and regional funds for BART renovation, and for BART to generate \$200 million as local match to the proposed grant funds.

The grant funding plan originally set forth in Resolution 2672 anticipated MTC programming its entire \$450 million commitment over the six-year period FY 1994 through FY 2000. Subsequent reductions in Congressional appropriations of transit system funding led MTC to extend its forecast of funds expected to be available to the Bay Area region, and therefore to BART, over the period of this CIP. MTC's current funding projections for BART extend to fiscal year 2006. With the recent passage of the TEA-21, Congress authorized additional funds to be allocated to the San Francisco Bay Area through the Formula Program. With the infusion of these funds to the region, MTC currently projects that it will complete the remainder of its Resolution 2672 commitment to BART by 2004.

Since the adoption of Resolution 2672, BART and MTC have continued to jointly pursue additional grant funding for the balance of the renovation program above the \$650 million outlined in the Resolution. As the financial program has evolved, grant sources will make up more than the \$450 million identified in Resolution 2672.

Generation of BART Funds

The CIP adopted in January 1995 (FY 1996-05) outlined the need for BART to issue bonds to match and supplement grants for the Systemwide Renovation Program. That CIP proposed bond issues for the spring of 1995, 1997, 1998 and 1999 to generate a total of approximately \$400 million. The source of debt service funds for this planned borrowing was proposed as a series of fare increases in 1995, 1996 and 1997 to fund the first \$200 million in bonds (as local match to the Resolution 2672 grant funds), and future revenue enhancement and/or cost reductions to fund the last \$200 million. The first three fare increases have been implemented as planned. BART has now more than met its Resolution 2672 match commitment.

The first bond issue was sold in May 1995, netting \$130 million. The second bond issue was not needed as early as forecast in the 1995 CIP, and was sold in March 1998, combining the planned 1997 and 1998 issues. This produced \$218 million for capital projects, of which \$130 million was for renovation. In combination, therefore, BART has generated \$260 million for renovation, exceeding the required commitment under Resolution 2672 by \$60 million. Financial projections carried in the companion document *Short Range Transit Plan (SRTP)* indicate that the combined debt service for

the 1995 and 1998 bond issues can be sustained with the revenue produced by the series of three fare increases already implemented. The proceeds of the 1995 and 1998 bond issues are being used to provide local match for Resolution 2672 renovation grants and other renovation and service improvement projects.

The last of the bond issues outlined in BART's 1995 Capital Improvement Program is required to complete the A/B Car Renovation Program and is currently expected to be issued early in FY 2000 to generate \$129 million of bond proceeds. The sale or delivery of the \$129 million in bonds needed for the remaining quantity order on the A&B Rehabilitation contract is currently scheduled to occur in early FY00. Because the District will commit to the remaining quantity order on a periodic basis between FY99 and FY02, the District may be able to defer the sale or delivery of all or a portion of these bonds to FY01, if actual project cashflow permits. Deferred sale or delivery could delay or reduce the additional annual debt service costs scheduled to commence in FY00 by as much as one full year. Deferring debt service costs on this \$129 million in bonds from FY00 to FY01 would save the District approximately \$10 million over the ten-year period.

In addition to the bond issues, the funding program has for several years included direct allocations from the operating budget to capital. The original funding program included \$76 million to be generated for capital in this manner over the period fiscal years 1995 through 2005.

The original \$1 billion renovation program assumed allocations from the operating to the capital budget in the amount of \$76 million between fiscal years 1997 and 2006. In addition, \$7.5 million of operating allocations was planned to fund a portion of the San Francisco Airport Extension capital reserve account (SF CAPRA). In fiscal year 1998, the District programmed an additional \$10 million to be allocated in fiscal years 1998 through 2003 from the operating to the capital budget to fund the C-1 vehicle midlife overhaul. Moreover, an additional \$29.6 million of operating allocations to the capital plan are now programmed to occur in fiscal years 2007 through 2009 to be used to replace work equipment and provide repairable inventory during that period. As of the end of fiscal year 1998, the capital plan is scheduled to receive a total of \$93.5 million over the original ten year period between fiscal years 1997 and 2006 and an aggregate of \$123.1 million of operating allocations over the entire period between fiscal years 1997 and 2009.

In fiscal year 1997, \$11.2 million was allocated to the capital plan. An additional \$5.3 million was allocated to the capital plan during fiscal year 1998. The fiscal year 1998 operating year-end result of \$8.2 million has also been allocated to the capital plan. As of the end of fiscal year 1998, \$24.7 has been allocated to the capital plan, leaving \$68.8 to be allocated between fiscal years 2000 and 2006 and \$29.1 to be allocated between fiscal years 2007 and 2009.

Funding Strategies by Program

As noted above, BART has defined a program of essential renovation requiring \$1.17 billion between inception of the program adopted in 1995 and the end of this CIP timeframe (FY 2009). The proposed funding sources are summarized in Table 2. Details for several major elements of the program are described in the following section.

A- and B-Car Renovation Program

The largest single component of the systemwide renovation program is the rebuilding of the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort is \$454,400,000. The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in federal Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in bridge toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$144 million. To date, BART has committed \$8.3 million. The rest of BART's commitment will come from the \$129 million fiscal year 2000 bond issue and other BART reserves.

The funding plan for this project is covered by a Federal Transit Administration (FTA) Letter of No Prejudice (LONP), which permitted BART to execute a contract for performance of renovation work in advance of actual receipt of most of the grant funds. The contract is comprised of a base order for renovation of the first 200 cars, fully covered by the LONP, and an option for the remaining 239 cars as additional funding becomes available. The deadline for executing the option is May 1999. This CIP forecasts availability of funding and execution of the option in FY 1999.

Other System Renovation Projects

Renovation of the remainder of the BART infrastructure (stations, power and train control systems, maintenance facilities, etc.) is being accomplished through a variety of funding sources. Through Resolution 2672, MTC has pledged to program \$140 million, to be matched by \$56.6 million from BART. BART's \$56.6 million match is being provided from the proceeds of the 1995 bond sale. Other grant sources and BART revenues are programmed for the remaining balance. Detail on the funding program for several large projects is provided below.

Automatic Fare Collection Equipment Modernization / Translink Implementation

After 25 years in service, BART's automatic fare collection equipment must be modernized through a combination of replacement and renovation. This project is currently estimated to cost \$77.776 million. As part of MTC's Resolution 2672 commitment, \$21.259 million in federal Section 9 funds are forecast to be granted to the project by the end of FY 1999. BART is seeking additional grant funds and BART revenues will be required to provide local match and supplemental funding to grants.

Rail Replacement

As train wheels grind against rail, especially on curves, the rail gradually wears away and must be replaced. This is a major, ongoing effort estimated to cost \$37 million by FY 2006. MTC programming under Resolution 2672 includes \$4 million in federal Section 9 before the end of FY 1998, and annual increments totaling an additional \$21 in Section 9 by FY 2006. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Ten-Year Overhaul of C-1 Cars

The overhaul of C-1 vehicles at the mid-span of their design life will reduce future maintenance costs and greatly improve the reliability of the cars, encouraging additional BART ridership. BART currently has programmed \$10 million of allocations from the operating to the capital budget to fund this project. Additional funding may be sought in the region or within BART.

Traction Power System Renovation

Traction power is the electricity that operates the motors that propel BART trains. The power system includes rectifiers, circuit breakers, cabling, and other components that have deteriorated with use and the passage of 25 years of service. This deterioration poses risks to reliable service delivery. BART has already allocated \$10 million in bond funds to begin this major project. MTC programming under Resolution 2672 includes a total of \$14.1 million in Section 3 funds over the period of FY 2004 through FY 2006 to continue the project. Additional Section 3 and Section 9 funds in the amount of \$31.5 million are being sought for this project. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Wayside Train Control System Renovation

The electronic components and circuitry that control the speed and switching of trains was state-of-the-art when the system opened for service. But many of these critical parts are now worn, unreliable, obsolete and very costly to maintain. This project will replace components and subsystems as necessary to keep BART train control safe and reliable. BART has already allocated \$4.802 million of bond issue funding to initiate the project. MTC programming under Resolution 2672 includes a total of \$35.2 million in Section 9 funds over the period FY 1999 through FY 2006. Additional Section 9 funds in the amount of \$11.509 million are being sought to

complete this project. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Advanced Automatic Train Control

This project is integral to BART's proposed future service plans, and also will reduce the need for a significant amount of renovation that would have been required on the existing train control system. The research and development phase is being carried out with a combination of federal defense conversion funds, matched by private sector and BART funds. Grant funding in the amount of \$47.1 million for implementation of AATC on the M- and upper A-lines has been programmed by MTC from state and federal sources. BART will need to generate the local match to this grant.

Escalator and Elevator Program

Replacement of many of the most critical station escalators, and complete renovation of other escalators and station elevators systemwide are among BART's highest priority renovation programs. These programs, totaling over \$50 million, have not competed well for grant funds in the past, so these efforts are expected to be carried out primarily with BART revenues. Grant sources will continue to be pursued as possible. However, these projects must be carried out immediately and are being funded from BART sources as necessary to keep them progressing.

Other Programs

Additional renovation funding needs beyond what can currently be reasonably forecast to become available are also presented in this CIP, at a conceptual planning level. The Track Two renovation program comprises projects which would be highly desirable to accomplish within the next ten years, but which are not at this time considered essential to reliable operation of future service levels within that timeframe. The Track Two renovation program is estimated at \$2.172 billion, including continued facility and C-1 car renovation.

System Extension Program

From the earliest days of its planning, the BART system has been envisioned by many as an expansive network of lines which ultimately would link most of the counties in the greater San Francisco Bay Area region. Limitations on funding restricted the original construction to 72 miles of double track in San Francisco, Alameda, and Contra Costa counties. But plans for extension of the original system continued to be considered throughout the 1970's and early 1980's.

In the mid-1980's several Bay Area counties began to explore the possibility of funding various transportation improvements, including BART extensions, through increases in voter-approved sales taxes. BART was granted significant funding from sales taxes in Alameda and Contra Costa counties, and from state and other sources, for extensions in those two counties. In Contra Costa County, an extension from the former end of the line at Concord now continues to new stations at North Concord-Martinez and Pittsburg-Bay Point. In Alameda County, the new branch line from Bay Fair Station to Castro Valley and Dublin-Pleasanton was built. Federal grants were simultaneously secured for an extension to Colma Station in San Mateo County. All of these projects have entered service in the last three years.

San Francisco International Airport--Millbrae Extension

This extension of the BART rail system is from the new Colma Station to San Francisco International Airport and the city of Millbrae. A Full Funding Grant Agreement was secured for this project in June 1997, solidifying its status in Track One. The funding plan for this project includes the following major elements: \$750 million in federal Section 3 funds; state funds totaling \$108 million; \$10 million in regional bridge tolls; \$200 million from the Airport; and \$99 million from SamTrans. BART also secured \$57.5 million in State funding to replenish the SFO project contingency. In addition, the District will provide a \$79.2 million Capital Reserve Account (CAPRA) for potential grant ineligible expenses associated with the project. The CAPRA will be generated through \$7.5 million in direct allocations from operating sources to be made in FY 1998 and FY 2000, and a dedicated bond issue of \$71.7 million planned for FY 2001.

Warm Springs Extension

This planned \$546 million extension, as reflected in this CIP, would extend from the current end of line at Fremont Station to two new stations at Irvington and Warm Springs in southern Alameda County. This project is listed partially in the Track One program in the amount of \$263 million based on existing regional funding commitments from a variety of sources. The \$283 million balance of the project cost is listed in Track Two pending identification of additional funding sources.

Oakland Airport Connector

This planned \$129.9 million extension would extend in an aerial alignment from the existing Oakland Airport-Coliseum Station to Oakland Airport, in Alameda County. This project is listed partially in the Track One program in the amount of \$4 million to be funded from the 1998 State Transportation Improvement Program for preliminary engineering and environmental work. The \$125.9 balance of the project cost is listed in Track Two pending identification of additional funding sources.

West Dublin-Pleasanton Station

This planned \$39.4 million project would build the third station originally planned for the Castro Valley-Dublin/Pleasanton Extension in Alameda County. This project is listed in the Track Two program. A negotiated procurement process is currently being implemented to identify and analyze potential funding mechanisms, including potential real estate development opportunities, for the construction of the station.

Pittsburg-Railroad Avenue Station

This planned \$200.1 million project would extend the new Pittsburg-Bay Point segment further east in Contra Costa County, to a new station at Railroad Avenue. A portion of this project is listed in the Track One program on the basis of remaining funds from the initial Measure C along with other funding sources. BART will continue to seek funding for the balance of the project, which continues to be listed in Track Two.

Seismic Retrofit Program

The original BART system was built in the late 1960's to standards far in excess of building codes in existence at that time. BART survived the major Loma Prieta earthquake of 1989 with only very minor damage, and returned to full service in a matter of hours. Since the 1960's much has been learned about how large structures such as BART facilities perform in major seismic events. Upgrades are now known to be technically feasible which would allow the system to withstand major earthquakes in the immediate vicinity of BART structures with the ability to resume service in a minimum amount of time.

At this time, the bulk of the \$535 million Seismic Retrofit Program is listed in Track Two pending identification of funding sources. A first increment in the amount of \$50.130 million is listed in Track One. \$22.230 million of that amount is based on negotiations currently underway with Caltrans for possible state funding to retrofit portions of the BART system which cross over Caltrans-maintained streets and roads. The remaining \$27.9 million is being sought from Section 9 grant funds.

The District is continuing to review and pursue funding options for the \$484.870 Track Two portion of the Seismic Retrofit Program. Potential funding options include Federal and State grant funds, general obligation bonds, sales tax revenue bonds and other financing mechanisms.

Service Improvements

BART and AC Transit have entered into a Memorandum of Understanding through which AC Transit is passing through to BART federal funds and local match for construction of intermodal transit center improvements at eight stations. Last year, the Bay Area Air Quality Management District provided funds for the \$704,000 program to improve the quality of bicycle access to BART stations. Additional Air District grant funds will be pursued to expand opportunities for bicycle access to the system. A combination of BART and grant funds are supporting prototype development and initial deployment of a "Pathfinder" sign program to help patrons find their way between stations from nearby facilities. Funds are programmed to implement maintenance facilities upgrade and expansion in the amount of \$23.064 million).

In addition to all of these Track One Service Improvement projects, this CIP also includes several proposed Track Two projects, including further deployment of the Pathfinder sign program, possible station area improvements at the 16th-Mission Street station in San Francisco, traction power system upgrades, and other projects which could significantly improve BART operations and/or expand BART capacity.

For the Track Two station area development projects (e.g., West Dublin, Oakland Coliseum, West Oakland and Balboa Park), there are three major grant funding sources that can be used to support these projects. The Transportation and Community and System Preservation (TCSP) Pilot Program provides \$20 million nationwide in fiscal year 1999 for planning and capital projects to address the relationship between transportation investments, land development patterns and environmental protection.

The Transportation for Livable Communities (TLC) Program provides funding for community-oriented transportation projects throughout the nine-county Bay Area that support the objectives of the Metropolitan Transportation Commission's Transportation/Land Use Connection Policies. The funding levels for fiscal year 1999 are \$65,000 for technical planning assistance, \$255,000 for community-based planning projects, and \$5 million for capital projects.

Transportation Enhancements Activities (TEA) is a federal program that funds primarily pedestrian, bicycle, landscaping, and historic preservation projects. TEA provides \$36 million to the nine-county Bay Area, half of which will go into a regional discretionary funding program administered by MTC and half of which will be distributed among the nine counties on a formula basis. Projects submitted for either TEA regional discretionary funding or TLC capital funding will be screened and scored based on a joint TEA/TLC checklist.

Additional station area development projects for which BART is working with local and regional jurisdictions, but is not the official sponsor, are listed at the end of Chapter 2 in a section titled Station Area Development. For the Mission Street Corridor

Revitalization Project, the San Francisco County Transportation Authority (SFCTA) is sponsoring this project in partnership with BART, MTC, MHDC, and the Mission Economic Development Association (MEDA). SFCTA has submitted a letter of intent to apply for TCSP funds and will likely be the applicant for TLC Capital funding for this project. For the Lafayette Station Access Project, the City will be applying for TEA or TLC capital funding. Finally, the various Station Area Development projects described together at the end of Chapter 2 will be sponsored by local jurisdictions and, in many cases, will be co-funded by private developers.

Research, Development and Demonstration

BART continues to work in various R&D areas with prior grant funds, including Station Cars and Superconducting Magnetic Energy Storage. Prior allocation of BART funds are being used to study possible advances in Adaptive Diagnostic Systems for improved transit vehicle reliability and faster, more efficient vehicle maintenance. BART will continue to seek grant funding for technological advances from specialized sources for which basic system renovation and expansion are not eligible.

Table 1

Track One Program – Funding Needs													
All figures in thousands of dollars (three decimals places dropped).													
Project		Total Cost	Funding to 6/30/98	Funding Requirement	1999	2000	2001	2002	2003	2004	2005	2006	2007-09
SYSTEM RENOVATION PROGRAM													
Rolling Stock Phase 1		454,400	229,760	224,640	26,137	89,139	82,164	22,600	4,600	0	0	0	0
A & B car renovation		10,534	10,534	0	0	0	0	0	0	0	0	0	0
Other rolling stock renovation projects		464,934	240,294	224,640	26,137	89,139	82,164	22,600	4,600	0	0	0	0
Subtotal Phase 1													
Rolling Stock Phase 2		10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000	0	0	0	0
C1 car mid-life overhaul		10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000	0	0	0	0
Subtotal Phase 2													
Subtotal Rolling Stock		474,934	243,294	231,640	28,137	91,139	83,164	23,600	5,600	0	0	0	0
Mainline Phase 1		37,012	10,559	26,453	3,061	3,078	3,156	3,240	3,324	3,410	3,529	3,653	0
Replace rail		3,328	3,328	0	0	0	0	0	0	0	0	0	0
TBT cathodic corrosion protection		3,306	3,306	0	0	0	0	0	0	0	0	0	0
Replace sump pumps in subway tunnels		5,269	5,269	0	0	0	0	0	0	0	0	0	0
Asbestos abatement (Phases 1-4)		10,000	17,655	17,655	0	0	0	0	0	5,684	5,683	6,008	0
Rohb traction power equipment		107,409	11,790	2,286	0	0	0	0	0	3,340	2,499	3,656	0
Other mainline renovation projects		107,409	51,510	55,898	5,357	3,078	3,156	3,240	3,324	12,334	11,911	13,397	0
Subtotal Phase 1													
Mainline Phase 2		27,899	0	27,899	0	4,244	4,371	6,753	8,115	2,674	1,496	246	0
Rohb traction power equipment		2,331	0	2,331	0	0	0	0	0	0	0	2,331	0
Emergency mainline repairs		30,220	0	30,220	0	4,244	4,371	6,753	8,115	2,674	1,496	2,577	0
Subtotal Phase 2													
Subtotal Mainline		137,638	51,510	66,128	5,357	7,322	7,529	9,993	11,439	15,108	13,407	15,973	0
Stations Phase 1		77,776	2,111	75,665	40,130	13,210	7,040	5,435	5,780	4,071	0	0	0
AFC modernization/Translink		12,121	12,121	0	0	0	0	0	0	0	0	0	0
Replace 19 station escalators		26,027	25,007	2,500	0	0	0	0	0	0	0	0	0
Elevator overhaul		10,995	6,429	4,175	0	0	0	0	0	0	0	0	0
Stations general renovation		65,707	15,376	49,741	8,778	7,260	5,263	5,400	5,540	5,684	5,832	5,984	0
Energy conservation (Embarcadero Station)		1,713	1,713	0	0	0	0	0	0	0	0	0	0
Other station renovation projects		20,028	25,128	4,290	3,490	0	0	0	800	0	0	0	0
Subtotal Phase 1		224,767	86,396	136,371	59,073	20,470	12,303	10,835	12,120	9,255	5,832	5,984	0
Stations Phase 2		2,383	0	2,383	0	0	0	0	0	0	0	0	0
Other station renovation projects		2,383	0	2,383	0	0	0	0	0	0	0	0	0
Subtotal Phase 2													
Subtotal Stations		227,150	86,396	138,754	61,456	20,470	12,303	10,835	12,120	9,255	5,832	5,984	0
Controls & Communications Phase 1		19,762	800	800	0	0	0	0	800	0	0	0	0
NATGEN (Non-Extension funded)		65,081	0	0	0	0	0	0	0	0	0	0	0
Fiber optic/radio network (TRACS)		102,600	37,600	2,000	0	0	0	0	0	0	0	0	0
Train control rehab		48,799	4,802	590	0	0	0	0	0	0	0	0	0
Replace Metrovision destination signs		1,300	1,300	1,783	0	0	0	0	0	0	0	0	0
DTS replacement (initial phase)		18,651	9,364	6,852	21,223	35,353	19,600	6,555	7,980	6,070	8,668	0	0
Other controls and communications projects		255,384	137,909	117,475	11,225	21,223	35,353	19,600	7,355	7,980	6,070	8,668	0
Subtotal Phase 1													
Controls & Communications Phase 2		212	0	212	0	0	0	0	0	0	0	0	0
Augment police radio coverage		2,719	0	2,719	0	1,235	201	228	256	286	266	246	0
Train control rehab		48	0	48	0	0	0	0	0	0	0	48	0
Emergency controls & communications		2,979	0	2,979	212	1,235	201	228	256	286	266	294	0
Subtotal Phase 2													
Subtotal Controls & Communications		258,362	137,909	120,453	11,437	22,458	35,554	19,828	7,612	8,266	6,336	8,962	0

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Table 1 (continued)

Track One Program – Funding Needs (continued)												
All figures in thousands of dollars (three decimals places dropped).												
Project	Total Cost	Funding to 6/30/98	Funding Requirement	1999	2000	2001	2002	2003	2004	2005	2006	2007/49
SYSTEM RENOVATION PROGRAM (continued)												
Facility Renovation and Replacement- Phase 1												
Repairables inventory (approx. \$2M per yr.)	21,511	3,412	18,099	2,000	2,080	2,175	2,225	2,305	2,375	2,424	2,515	0
Hayward Shop location major repair facility	3,186	3,186	0	0	0	0	0	0	0	0	0	0
Employee facility improvements	1,000	213	787	787	0	0	0	0	0	0	0	0
Richmond Shop & Yard security improvements	1,770	1,070	700	700	0	0	0	1,000	1,000	0	0	0
Replace shop roofing	3,000	0	3,000	0	0	0	0	0	0	0	0	0
Other shop and yard renovation projects	13,460	11,073	2,387	2,387	0	0	0	0	0	0	0	0
Subtotal Phase 1	43,927	18,954	24,973	5,874	2,080	2,175	2,225	3,305	3,375	3,424	2,515	0
Facility Renovation and Replacement- Phase 2												
Repairables inventory (approx. \$2M per yr.)	8,010	0	8,010	0	0	0	0	0	0	0	0	8,010
Hayward Tower renovation	211	0	211	211	0	0	0	0	0	0	0	0
Subtotal Phase 2	8,031	0	8,031	211	0	0	0	0	0	0	0	8,010
Subtotal Facility Renovation & Replacement	51,958	18,954	33,004	5,895	2,080	2,175	2,225	3,305	3,375	3,424	2,515	8,010
Work Equipment- Phase 1												
Work equipment	37,941	7,512	30,430	4,360	3,150	3,340	3,530	3,720	3,910	4,110	4,310	0
Subtotal Phase 1	37,941	7,512	30,430	4,360	3,150	3,340	3,530	3,720	3,910	4,110	4,310	0
Work Equipment- Phase 2												
Work equipment	21,586	0	21,586	0	0	0	0	0	0	0	0	21,586
Subtotal Phase 2	21,586	0	21,586	0	0	0	0	0	0	0	0	21,586
Subtotal Work Equipment	59,527	7,512	52,016	4,360	3,150	3,340	3,530	3,720	3,910	4,110	4,310	21,586
Subtotal SYSTEM RENOVATION PROGRAM	1,209,570	547,575	661,995	116,642	146,619	144,065	70,011	43,796	40,413	33,109	37,744	29,596
EXTENSIONS PROGRAM- Phase 1												
to Colma (IFCA)	170,179	170,179	0	0	0	0	0	0	0	0	0	0
to Dublin-Pleasanton	543,050	543,050	0	0	0	0	0	0	0	0	0	0
to Pittsburg-Bay Point	505,740	505,740	0	0	0	0	0	0	0	0	0	0
to San Francisco International Airport (SFO)	1,120,000	190,219	929,781	921,281	0	8,500	0	0	0	0	0	0
SFO CAPRA	70,700	4,650	66,050	0	2,850	63,200	0	0	0	0	0	0
Power substations for SFO	12,500	12,500	0	0	0	0	0	0	0	0	0	0
to Warm Springs	262,800	15,700	247,100	4,000	4,000	4,000	4,500	7,900	11,500	19,900	19,500	171,800
Oakland Airport Connector	4,000	4,000	0	4,000	0	0	0	0	0	0	0	0
Pittsburg-Bay Point to Railroad Ave.	96,000	96,000	0	0	0	0	0	0	0	0	0	0
Subtotal EXTENSIONS PROGRAM	2,784,969	1,538,038	1,246,931	929,281	6,650	75,700	4,500	7,900	11,500	19,900	19,500	171,800
SEISMIC RETROFIT PROGRAM- Phase 2												
Seismic study projects	3,430	0	3,430	3,430	0	0	0	0	0	0	0	0
Seismic retrofit projects	46,700	0	46,700	30,000	8,600	8,100	0	0	0	0	0	0
Subtotal SEISMIC RETROFIT PROGRAM	50,130	0	50,130	33,430	8,600	8,100	0	0	0	0	0	0

Table 1 (continued)

Track One Program – Funding Needs (continued)												
Project	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
SERVICE IMPROVEMENT PROGRAM												
Service Improvement Program- Phase 1												
Shop expansion and upgrade	23,046	1,992	21,054	10,064	10,990	0	0	0	0	0	0	0
Anti-graffiti program	580	580	0	0	0	0	0	0	0	0	0	0
Bicycle access improvements	704	704	0	0	0	0	0	0	0	0	0	0
Transit centers	26,376	25,790	586	565	0	0	0	0	0	0	0	0
Other service improvement renovations	17,582	10,498	7,084	1,584	0	5,500	0	0	0	0	0	0
Subtotal Phase 1	68,268	39,565	28,703	12,213	10,990	5,500	0	0	0	0	0	0
Service Improvement Program- Phase 2												
Additional new bike lockers	500	0	500	500	0	0	0	0	0	0	0	0
Finishale transit village	3,080	3,080	0	0	0	0	0	0	0	0	0	0
Other service improvement renovations	9,600	0	8,600	8,600	0	0	0	0	0	0	0	0
Subtotal Phase 2	12,180	3,080	9,100	9,100	0	0	0	0	0	0	0	0
SUBTOTAL SERVICE IMPROVEMENT PROGRAM	80,648	42,645	38,003	21,513	10,990	5,500	0	0	0	0	0	0
RESEARCH, DEVELOPMENT AND DEMONSTRATION- Phase 1												
Research, development and demonstration projects	4,243	4,243	0	0	0	0	0	0	0	0	0	0
Subtotal Phase 1	4,243	4,243	0	0	0	0	0	0	0	0	0	0
SUBTOTAL RESEARCH, DEVELOPMENT AND DEMONSTRATION- Phase 1												
OTHER FINANCIAL OBLIGATIONS												
Other Financial Obligations- Phase 1	100,041	99,401	640	80	80	80	80	80	80	80	80	80
Other financial obligations	100,041	99,401	640	80	80	80	80	80	80	80	80	80
Subtotal Phase 1	240	0	240	0	0	0	0	0	0	0	0	240
Other Financial Obligations- Phase 2	240	0	240	0	0	0	0	0	0	0	0	0
Met Center capital reserve	240	0	240	0	0	0	0	0	0	0	0	240
Subtotal Phase 2	240	0	240	0	0	0	0	0	0	0	0	240
SUBTOTAL OTHER FINANCIAL OBLIGATIONS	100,281	99,401	880	80	80	80	80	80	80	80	80	240
UNASSIGNED CAPITAL NEED	1,800	0	1,800	1,800	0	0	0	0	0	0	0	0
TOTAL TRACK ONE FUNDING NEEDS	4,231,641	2,231,902	1,999,739	1,102,746	173,139	233,445	74,591	51,776	51,993	53,089	57,324	201,636

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Table 2

Track One Program – Funding Sources

All figures in thousands of dollars, three decimal places dropped.

Project	Total Program	Allocated to 6/30/98	Amount to be Allocated	Fiscal Year Programmed								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
SYSTEM RENOVATION PROGRAM												
ATC RESOLUTION 2672												
Federal Section 3	239,473	239,473	0	0	0	0	0	0	0	0	0	0
Automatic fare collection modernization /translink	24,087	0	24,087	24,087	0	0	0	0	0	0	0	0
Traction power equipment rehabilitation	6,492	0	6,492	0	0	0	0	6,492	0	0	0	0
Subtotal Federal Section 3	270,052	239,473	30,579	24,087	0	0	0	6,492	0	0	0	0
Federal Section 9	21,135	8,447	12,688	2,449	2,462	2,526	2,592	2,659	0	0	0	0
Replace running rail & accessories	12,294	0	12,294	0	3,395	3,497	5,402	0	0	0	0	0
Traction power equipment rehabilitation	21,259	8,072	13,187	13,187	0	0	0	0	0	0	0	0
Automatic fare collection modernization /translink	21,066	0	21,066	4,000	4,104	4,210	4,320	4,432	0	0	0	0
General station renovation	640	0	640	0	0	0	0	0	0	0	0	0
12th Street elevator renovation	22,603	0	22,603	4,000	5,093	4,371	4,502	4,637	0	0	0	0
Train control equipment rehabilitation	98,997	17,159	81,838	23,636	15,094	14,604	16,816	11,728	0	0	0	0
Subtotal Federal Section 9	30,000	15,000	15,000	5,000	5,000	5,000	5,000	5,000	0	0	0	0
CMQA-STIP (A & B car renovation)	15,000	15,000	0	0	0	0	0	0	0	0	0	0
State Proposition 108 (A & B car renovation)	15,000	15,000	0	0	0	0	0	0	0	0	0	0
State TCI	1,974	1,974	0	0	0	0	0	0	0	0	0	0
A & B car renovation	348	0	348	348	0	0	0	0	0	0	0	0
Elevator overhaul	2,322	1,974	348	348	0	0	0	0	0	0	0	0
Subtotal State TCI	450,448	304,606	145,842	58,071	21,175	21,570	24,293	20,732	0	0	0	0
ATC Bridge Tolls	24,000	16,000	8,000	4,000	4,000	0	0	0	0	0	0	0
A & B car renovation	5,650	0	5,650	1,000	1,273	1,093	1,126	1,159	0	0	0	0
Train control equipment rehabilitation	4,427	0	4,427	0	849	874	1,351	1,353	0	0	0	0
Traction power equipment rehabilitation	34,077	16,000	18,077	5,000	6,122	1,966	2,477	2,512	0	0	0	0
Subtotal ATC Bridge Tolls	450,448	304,606	145,842	58,071	21,175	21,570	24,293	20,732	0	0	0	0
GRANT FUNDING PER MTC RESOLUTION 2672												
1995 Bond Proceeds	93,664	92,043	1,621	1,621	0	0	0	0	0	0	0	0
1998 Bond Proceeds	706,336	95,955	10,381	10,381	0	0	0	0	0	0	0	0
TOTAL FUNDING PER MTC RESOLUTION 2672	650,447	492,604	157,843	70,073	21,175	21,570	24,293	20,732	0	0	0	0
Federal Section 3 (traction power equipment rehabilitation)	17,657	0	17,657	0	0	0	0	0	6,687	5,903	5,067	0
Federal Section 9	38,437	1,200	37,237	0	0	0	0	0	12,051	12,408	12,777	0
CMQA-STIP	26,945	0	26,945	3,500	14,045	0	8,500	0	0	0	0	0
State TCI (general station renovation & station roofing)	1,525	1,525	0	0	0	0	0	0	0	0	0	0
State STIP (ATC & AATQ)	40,555	0	40,555	2,500	33,055	0	0	0	2,500	2,500	0	0
ATC Bridge Tolls	22,733	300	22,433	1,612	1,642	1,685	1,728	2,043	4,685	4,578	4,461	0
1998 Bond Proceeds	39,327	26,630	18,597	17,532	1,065	0	0	0	0	0	0	0
Planned 1999 Bond Proceeds (A & B car renovation)	129,000	0	129,000	0	129,000	0	0	0	0	0	0	0
Interest Earnings	6,735	0	6,735	6,735	0	0	0	0	0	0	0	0
Reimbursement	630	0	630	630	0	0	0	0	0	0	0	0
Private Sector Financing (AATQ)	11,000	11,000	0	5,103	2,970	6,684	0	0	0	0	0	0
Previous Reserves	69,999	54,342	14,757	0	0	0	0	0	0	0	0	0
Miscellaneous Grants	49,205	49,205	0	0	0	0	0	0	0	0	0	0
Allocations from Operating	107,277	3,000	104,277	12,341	5,520	7,600	3,220	9,120	11,170	10,220	15,170	29,316
TOTAL SYSTEM RENOVATION PROGRAM	1,209,571	633,806	575,765	120,025	208,873	37,739	37,741	31,895	37,093	35,609	37,475	29,316

Table 2 (continued)

Track One Program – Funding Sources (continued)										
All figures in thousands of dollars (three decimals places dropped).										
Project	Total Program	Allocated to 6/30/98	Amount to be Allocated	Fiscal Year Programmed						
				1999	2000	2001	2002	2003	2004	2005
SERVICE IMPROVEMENT, RESEARCH & DEVELOPMENT AND OTHER FINANCIAL OBLIGATIONS										
CMAQ-STP	6,000	0	0	6,000	0	0	0	0	0	0
STATE TCI	348	0	0	348	0	0	0	0	0	0
1995 Bond Proceeds	36,687	36,547	140	140	0	0	0	0	0	0
1998 Bond Proceeds	60,016	39,586	20,430	20,430	0	0	0	0	0	0
Interest Earnings	18,665	12,003	1,662	1,662	0	0	0	0	0	0
1995 Cross Border Lease	2,665	2,665	0	0	0	0	0	2,003	2,004	2,005
Previous Reserves	10,100	8,114	1,986	1,986	0	0	0	0	0	0
Miscellaneous Grants	42,388	34,971	7,417	1,917	0	5,500	0	0	0	0
Allocations from Operating	8,282	7,402	880	160	80	0	80	80	80	80
SUBTOTAL SERVICE IMPROVEMENT, RESEARCH & DEVELOPMENT AND OTHER FINANCIAL OBLIGATIONS	185,171	146,288	32,883	32,663	80	5,500	80	2,083	2,084	2,085
SEISMIC RETROFIT PROGRAM										
Federal Section 9	22,220	0	22,220	8,960	6,880	6,480	0	2,003	2,004	2,005
MTC Bridge Tolls	5,580	0	5,580	2,240	1,720	1,620	0	0	0	0
Miscellaneous Grants	230	0	230	230	0	0	0	0	0	0
California seismic engineering study (Caltrans)	22,000	0	22,000	22,000	0	0	0	0	0	0
Seismic lifeline (Caltrans)	22,220	0	22,220	22,220	0	0	0	0	0	0
Subtotal Miscellaneous Grants	50,130	0	50,130	31,430	8,600	8,100	0	2,003	2,004	2,005
SUBTOTAL SEISMIC RETROFIT PROGRAM										
EXTENSIONS PROGRAM										
Funding for Corona extension (FTCA)	170,179	170,179	0	0	0	0	0	0	0	0
Funding for Dublin-Pleasanton extension	543,050	543,050	0	0	0	0	0	0	0	0
Funding for Pittsburg Bay Point extension	505,740	0	0	0	0	0	0	0	0	0
Funding for San Francisco Airport extension (SCO) ⁱⁱⁱ	1,111,500	190,219	921,281	921,281	0	0	0	0	0	0
Dedicated bond issue for SFO CMAPA	71,700	71,700	0	0	0	71,700	0	0	0	0
Allocations from Operating for SFO CMAPA	4,650	4,650	0	0	0	0	0	0	0	0
Funding for SFO BART extension (SCO)	12,500	12,500	0	0	0	0	0	0	0	0
Funding for Warm Springs extension	262,600	15,700	247,100	4,000	4,000	4,000	4,500	7,900	11,500	19,500
Funding for Oakland Airport connector	4,000	0	4,000	4,000	0	0	0	0	0	0
Existing Measure C funding for Bay Point to Railroad Ave ex	96,000	96,000	0	0	0	0	0	0	0	0
SUBTOTAL EXTENSIONS PROGRAM	2,784,969	1,536,038	1,246,931	932,131	4,000	75,700	4,500	7,900	11,500	19,500
UNASSIGNED CAPITAL ALLOCATIONS	1,800	0	1,800	1,800	0	0	0	0	0	0
TOTAL TRACK ONE PROGRAM	4,231,441	2,318,132	1,907,309	1,120,049	221,553	127,039	42,321	43,881	52,681	59,599
										61,067
										201,356

ⁱⁱⁱ SFO Project funding does not include \$11.3M from SFIA and \$2M from San Mateo County flood control district.

Chapter 4

PROJECT LISTINGS: FUNDING NEEDS AND PRIORITIES

I. SYSTEMWIDE RENOVATION PROGRAM

I-A. Rolling Stock Renovation (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 1													
Replace A & B car door components	4,688	4,688	0										0
Replace electrical coupler on C1 cars	1,920	1,920	0										0
Replace electrical coupler on A, B, and C1 cars	1,900	1,900	0										0
Wheel refurbishment program	2,026	2,026	0										0
A & B car renovation ¹⁰	454,400	229,760	224,640	26,137	89,139	82,164	22,600	4,600					0
Subtotal Phase 1	464,934	240,294	224,640	26,137	89,139	82,164	22,600	4,600	0	0	0	0	0
Phase 2													
C1 car mid-life overhaul	10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000					0
Subtotal Phase 2	10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000	0	0	0	0	0
Total Track One	474,934	243,294	231,640	28,137	91,139	83,164	23,600	5,600	0	0	0	0	0

¹⁰ "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$20,000,000 in CMAQ, \$1,973,500 in TC, \$15,000,000 in Prop. 108 bonds, \$16,000,000 in bridge tolls, and \$8,271,000 in BART funds.

¹⁰ "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$20,000,000 in CMAQ, \$1,973,500 in TCI, \$15,000,000 in Prop. 108 bonds, \$16,000,000 in bridge tolls, and \$8,271,000 in BART funds.

I-A. Rolling Stock Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
C1 car renovation	265,000	0	265,000
Fleet upgrades	15,000	0	15,000
Subtotal Priority 1	280,000	0	280,000
Priority 2			
Install automatic train control restoration units (ARU)	2,500	0	2,500
Subtotal Priority 2	2,500	0	2,500
Total Track Two	282,500	0	282,500
* All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Rolling Stock Renovation Program (Track One & Two)			
	757,434	243,294	514,140

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

1-B. Mainline Renovation (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 1													
Track embankment upgrade	243	243	0										0
181 inspection modifications	1,895	1,895	0										0
TBT cathodic corrosion protection	3,328	3,328	0										0
Replace dry with wet standpipes	8,927	8,927	0										0
Recast steel tunnel liner rings	586	586	0										0
R-C/W fencing	458	458	0										0
Calltrans reimbursable projects	3,097	3,097	0										0
Calltrans reimbursable (1-800 support)	350	350	0										0
Repair grinders & bridges	2,012	2,012	0										0
Replace sump pumps in subway tunnels	3,506	3,506	26,453	3,061	3,078	3,158	3,240	3,324	3,410	3,529	3,653	0	
Replace rail	27,655	10,000	17,655						5,684	5,883	6,088	0	
Rehab traction power equipment	1,337	1,337	0									0	
Rehab subway vent fans	11,514	0	11,514	2,020					3,340	2,499	3,656	0	
Emergency mainline repairs	430	143	277	277								0	
Traction power house roofs	5,269	5,269	0									0	
Asbestos abatement (Phase 1.4)												0	
Subtotal Phase 1	107,409	51,510	55,899	5,357	3,078	3,158	3,240	3,324	12,434	11,911	13,397	0	
Phase 2													
Rehab traction power equipment	27,899	0	27,899		4,244	4,371	6,753	8,115	2,674	1,496	246	0	
Emergency mainline repairs	2,331	0	2,331								2,331	0	
Subtotal Phase 2	30,230	0	30,230	0	4,244	4,371	6,753	8,115	2,674	1,496	2,577	0	
Total Track One	137,638	51,510	86,128	5,357	7,322	7,529	9,993	11,439	15,108	13,407	15,973	0	

I-B. Mainline Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
Additional traction power system renovation	35,000	0	35,000
Transday Tube cathodic protection	2,500	0	2,500
Lake Merril Channel subway repair	2,000	0	2,000
Expansion of existing tunnel	1,000	0	1,000
Expansion of existing tunnel (Phase 2)	2,000	0	2,000
Tunnel ventilation systemwide (Phase 2)	2,000	0	2,000
Subtotal Priority 1	45,000	0	45,000
Priority 2			
Remove gaps in handrail along emergency walkways; remove obstructions on emergency walkways	2,000	0	2,000
T&T fan and main damper control improvements	3,000	0	3,000
Additional elect. insulation at various locations (trackway)	300	0	300
Subtotal Priority 2	5,300	0	5,300
Priority 3			
Dry standpipes at I-680 and Springbrook crossings	370	0	370
Subtotal Priority 3	370	0	370
Total Track Two	50,670	0	50,670
* All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Mainline Renovation Program (Track One & Two)	188,308	51,510	136,798

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

I-C. Stations Renovation (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 1													
Replace LMS concrete roof	215	215	0										0
Replace security gates at some stations	34	34	0										0
12th Street elevator replacement	900	900	0										0
Replace four fire alarm	350	350	0										0
Replace four Embarcadero escalators	2,777	2,777	0										0
Replace floors on ten elevators	510	510	0										0
ADA key station informational signage	470	470	0										0
Stations security program	4,258	4,228	30	30									0
Agent ticket reader	330	330	0										0
Modify change machines	925	925	0										0
Cubic faregate modifications	772	772	0										0
Add faregates for storage at var. stations	1,564	1,564	0										0
ADA AFC	1,500	1,500	0										0
ADA AFC	72	72	0										0
ADA AFC charger prototype	250	250	0										0
Replace fare mats at three stations	597	597	0										0
Replace and add bike lockers	364	364	0										0
MacArthur Station emergency egress improvement	28,027	25,527	2,500	2,500									0
Escalator overhaul	12,121	12,121	0										0
Replace 19 station escalators	251	251	0										0
Ogawa Plaza project	10,595	6,420	4,175	4,175									0
Elevator overhaul	452	452	0										0
Remove architectural barriers	455	455	0										0
ADA key station informational signage	1,713	1,713	0										0
Replace bus transfer ticket machines	3,406	3,406	0										0
Energy conservation (Embarcadero Station)	77,776	2,111	75,665	40,130	13,210	7,040	5,435	5,780	4,071				0
Credit/debit vendor	4,320	2,320	2,000	2,000									0
AFC modernization/Translink	1,485	1,485	0										0
Interim AFC upgrades	1,350	870	870	870									0
Replace station signage	13,730	590	590	590									0
ADA key station parking modifications	5,761	3,130	5,473	3,130	2,130								0
Eight stations, general renovation	1,032	920	112	112									0
Four stations, general renovation	1,344	1,021	323	323									0
Replace station roofing	7	7	0										0
Repair platform substructures	43,833	0	43,833	5,000	5,130	5,263	5,400	5,540	5,684	5,832	5,984		0
Replace platform edge tile	800	0	800				800						0
Future general stations renovation													0
West Oakland limit structures													0
Subtotal Phase 1	224,767	88,396	136,371	59,073	20,470	12,303	10,835	12,120	9,755	5,832	5,984	0	0
Phase 2													
Access Upgrade: MacArthur Station elevator mod.s	300	0	300	300									0
Access Upgrade: non-key station parking modifications	733	0	733	733									0
Access Upgrade: AFC swing gates and related	350	0	350	350									0
Access Upgrade: electronic elevator signs	400	0	400	400									0
Access Upgrade: misc. bathroom barrier removal	400	0	400	400									0
Access Upgrade: bathroom & elevator directional signs	200	0	200	200									0
Subtotal Phase 2	2,383	0	2,383	2,383	0	0	0	0	0	0	0	0	0
Total Track One	227,150	88,396	138,754	61,456	20,470	12,303	10,835	12,120	9,755	5,832	5,984	0	0

I-C. Stations Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
General station renovation (incl. sewage pumps, standby generators, etc.)	30,000	0	30,000
Replace platform edge detectable warning system at 20 core stations	5,500	0	5,500
McAuliffe Sta. elevator replacement (net additional)	2,000	0	2,000
AFC expansion	30,000	0	30,000
Additional security improvement at 8 downtown stations	5,000	0	5,000
Replace Stewart-Warner signheads	12,000	0	12,000
Resurface parking lot pavement	4,200	0	4,200
Replace station P.A., platform CCTV, security CCTV, yard P.A.	5,625	0	5,625
Station recording	3,000	0	3,000
Reliab. gauge and other elevators (LMA)	132,775	0	132,775
Subtotal Priority 1			
Priority 2			
Energy conservation	21,190	0	21,190
Replace North Berkeley Station ceiling	1,070	0	1,070
AFC (BMT) compressor replacement	1,000	0	1,000
AFC upgrades for equipment software & electronics	4,000	0	4,000
Replace hydraulic lift cylinders	4,000	0	4,000
Subtotal Priority 2			
Total Track Two			
	30,840	0	30,840
	163,615	0	163,615
* All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Stations Renovation Program (Track One & Two)			
	390,765	88,396	302,369

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

I-D. Controls & Communications Renovation (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 1													
Reverse funding in 1BT	180	180	0									0	
Emergency control center back-up	29	29	0									0	
Train ID enhancement	1,580	1,580	0									0	
Yard train control improvements	1,946	1,946	0									0	
Cab handling improvements	1,207	1,207	0									0	
Replace MVDs	373	373	0									0	
Train control rehab	48,790	4,802	43,988	5,000	5,130	5,263	5,400	5,540	5,684	5,833	6,088	0	
Fiber optic/radio network (TRACS)	65,081	65,081	0									0	
AATC	102,600	37,600	65,000	5,800	15,000	30,000	14,200					0	
Automated Police Dispatch	452	452	0									0	
Comspec position in Central	350	195	155	155								0	
Replace workstation consoles in Central	1,187	1,187	0									0	
Replace MetroVision destination signs	1,300	1,300	0									0	
NATGEN ⁽¹⁾	19,762	19,762	0									0	
MIS mainframe computer	600	600	0									0	
Replace MARS	1,615	1,615	0									0	
DTS replacement (initial phase)	1,615	1,615	0									0	
Train and cable plant replacement	1,550	1,550	0									0	
Emergency controls & communications	6,781	0	6,781	270	93	90		1,815	1,745	187	2,580	0	
Subtotal Phase 1	255,384	137,909	117,475	11,225	21,223	35,353	19,600	7,355	7,980	6,070	6,668	0	
Phase 2													
Augment police radio coverage	212	0	212	212								0	
Train control rehab	2,719	0	2,719	0	1,235	201	228	256	286	266	246	48	
Emergency controls & communications	48	0	48									0	
Subtotal Phase 2	2,979	0	2,979	212	1,235	201	228	256	286	266	294	0	
Total Track One	258,362	137,909	120,453	11,437	22,458	35,554	19,828	7,612	8,266	6,336	6,962	0	

⁽¹⁾ Does not include portions funded in extensions budgets.

⁽¹⁾ Does not include portions funded in extensions budgets.

I-D. Controls & Communications Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
Install AATC on remainder of core system, ABRCK lines	45,000	0	45,000
Install AATC complementary technology, broken rail detection and			
silent train detection	20,000	0	20,000
Install AATC complementary technology, program stop	5,000	0	5,000
Central computer system software development, AATC support	10,000	0	10,000
Replacement of interlocking relay-based logic with microprocessor-			
based logic	4,000	0	4,000
DTS replacement (balance of system) Systemwide cable plant			
Optimizes computer replacement	5,000	0	5,000
Wayside wiring for interlocking replacement underground	8,000	0	8,000
Telephone switch replacement (19 locations)	5,000	0	5,000
Network hardware & software upgrades (replacements)	4,000	0	4,000
Richmond & Daily City Yard console replacement	9,000	0	9,000
AVI readers at yards & other locations	2,400	0	2,400
	4,000	0	4,000
Subtotal Priority 1	121,400	0	121,400
Priority 2			
Install new systems, yard, shop & tower data network	1,600	0	1,600
Replace yard voice recorders	500	0	500
AATC on CSX/DPM/MSFO lines	27,000	0	27,000
Subtotal Priority 2	29,100	0	29,100
Total Track Two	150,500	0	150,500

* All Track Two project cost estimates are conceptual, for planning purposes only.

Total Controls & Communications Renovation Program (Track One & Two)	408,862	137,909	270,953
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NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

I.E. Facility Renovation and Replacement (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Phase 1												
Repairs: Hayward Shop fire main	2,23	223	0									0
Repairs: Hayward wheel press	544	544	0									0
Replace shop parts washers	550	263	287	287								0
Yard fuel tanks	38	38	0									0
Richmond Yard efficiency improvements	353	353	0									0
Emergency Richmond Shop roof repairs	73	73	0									0
Wheel tiring machines	3,590	3,590	0									0
Wheel/tail maintenance study	123	123	0									0
Central receiving & distribution facility study	10	10	0									0
Hayward Shop traction motor repair facility	3,186	3,186	0									0
Replace dust collector systems at Rich. & Conc.	1,646	1,646	0									0
Richmond oil/water separator tanks	136	136	0									0
Richmond Shop & Yard security improvements	1,538	538	1,000	1,000								0
Transfer track crossings	1,770	1,070	700	700								0
Reconfigure Transportation Buildings	360	360	0									0
CHB security improvements	3,395	2,295	1,100	1,100								0
Replace Met Center fuel tank	675	675	0									0
Hayward test track security	108	108	0									0
1,000 volt shop power supplies	70	70	0									0
Employee facility improvements	1,000	213	787	787								0
Repairs: inventory (approx. \$2M per yr.)	21,111	3,213	18,098	2,000	2,080	2,175	2,225	2,305	2,375	2,424	2,515	0
Replace shop roofing	3,000	0	3,000					1,000	1,000	1,000		0
Subtotal Phase 1	43,927	18,954	24,973	5,874	2,080	2,175	2,225	3,305	3,375	3,424	2,515	0
Phase 2												
Repairs: inventory (approx. \$2M per yr.)	8,010	0	8,010									8,010
Hayward Tower renovation	21	0	21	21								0
Subtotal Phase 2	8,031	0	8,031	21								8,010
Total Track One	51,958	18,954	33,004	5,895	2,080	2,175	2,225	3,305	3,375	3,424	2,515	8,010

I-E. Facility Renovation and Replacement (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
Additional storage facilities includes new central stores warehouse	7,500	0	7,500
Warehouse & other District facilities	2,000	0	2,000
Overhead cranes - recondition (Hayward, Richmond, Concord, Daly City) include SF	1,500	0	1,500
Car wash facility replacement at Richmond & Hayward	7,000	0	7,000
Rehabilitation of TransBay Tube facility	1,000	0	1,000
Subtotal Priority 1	19,000	0	19,000
Priority 2			
Lake Merritt Building renovation	7,000	0	7,000
Replace shop roll-up doors (Rich, Hay, Conc, Oak)	1,250	0	1,250
Replace yard disconnect enclosures	1,000	0	1,000
Replace yard pump pumps	260	0	260
Recondition yard pump pumps	2,000	0	2,000
Replace yard pump pumps	1,000	0	1,000
Train operator training simulator	1,000	0	1,000
Resource road/parking and relamp shopyard exterior lights	310	0	310
Replace grease/oil facilities (Hayward, Richmond, Concord, Daly City)	160	0	160
Storage area canopy, lighting and office at Richmond Shop	1,000	0	1,000
Replace Oakland Shop fuel facility	1,000	0	1,000
Subtotal Priority 2	13,780	0	13,780
Total Track Two	32,780	0	32,780

* All Track Two project cost estimates are conceptual, for planning purposes only.

Total Facility Renovation Program (Track One & Two)	84,736	18,954	65,784
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NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

1.F. Work Equipment (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Phase 1 (On-going projects 1995-2006)												
Automobile-type vehicles (\$1.2M per yr.)	15,218	2,828	12,400	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900	
M&E equipment (approx. \$200K per yr.)	2,483	523	1,960	210	220	230	240	250	260	270	280	
Mile-equipment	143	143	0	150	110	120	130	140	150	160	170	
Non-opt depts. equipment (\$100K per yr.)	1,230	100	1,130	800	890	910	930	950	970	1,000	1,150	
Non-revenue rail vehicles (\$850K per yr.)	10,075	2,125	7,950	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	
Other Ops depts. equipment (\$100K per yr.)	1,334	214	1,080	100	110	120	130	140	150	160	170	
PC equipment (\$500K per yr.—300 machines)	6,318	1,578	4,740	500	520	540	560	580	600	620	640	
ADA Equipment	350	0	350	350								
Subtotal Phase 1	36,941	7,512	29,430	3,360	3,150	3,340	3,530	3,720	3,910	4,110	4,310	0
Phase 1 (New)												
Currency counter replacement	1,000	0	1,000	1,000								
Subtotal Phase 1 (New)	1,000	0	1,000	1,000	0	0	0	0	0	0	0	0
Phase 2 (includes on-going projects 2007-2009)												
Automobile-type vehicles (\$1.2M per yr.)	6,300	0	6,300									6,300
M&E equipment (approx. \$200K per yr.)	900	0	900									900
Non-Opt depts. equipment (\$100K per yr.)	570	0	570									570
Non-revenue rail vehicles (\$850K per yr.)	3,750	0	3,750									3,750
Other Ops depts. equipment (\$100K per yr.)	570	0	570									570
PC equipment (\$500K per yr.—300 machines)	2,460	0	2,460									2,460
Additional spare parts	7,456	0	7,456									7,456
Subtotal Phase 2	21,586	0	21,586	0	0	0	0	0	0	0	0	21,586
Total Track One	59,527	7,512	51,016	3,360	3,150	3,340	3,530	3,720	3,910	4,110	4,310	21,586

I-F. Work Equipment (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
Subtotal Priority 1	0	0	0
Total Track Two	0	0	0
* All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Work Equipment Renovation Program (One & Two)	59,527	7,512	51,016

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

III. EXTENSIONS (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Phase 1												
to Colma (FICA) ^{1a}	170,179	170,179	0									
to Dublin-Pleasanton ^{1a}	543,050	543,050	0									
to Pittsburg Bay Point ^{1a}	505,740	505,740	0									
to San Francisco International Airport (SFO) ^{1a}	1,120,000	1,120,000	929,281	929,281								
SFO CAPRA ^{1a}	1,120,000	1,120,000	0									
Power substations for SFO	12,500	12,500	0									
to Warm Springs ^{1a}	282,800	15,700	247,100	4,000	4,000	4,000	4,500	7,900	11,500	19,900	19,500	171,800
Oakland Airport Connector ^{1a}	96,000	96,000	0									
Pittsburg Bay Point to Railroad Ave. ^{1a}												
Subtotal Phase 1	2,784,969	1,442,038	1,246,931	929,281	6,850	75,700	4,500	2,900	11,500	19,900	19,500	171,800
Total Track One	2,784,969	1,442,038	1,246,931	929,281	6,850	75,700	4,500	2,900	11,500	19,900	19,500	171,800

^{1a} "Total Cost" shown is programmed funding. Actual final cost to be determined upon financial close-out of project.

FTA approved funding plan includes \$750M total from FTA (\$154M has been appropriated to date), \$994 total from the Amendment to the BART-San Trans Agreement (\$76.5M has been appropriated to date), \$165.5M total in state funds (\$104M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$7.4M received to date), \$87M from the San Francisco International Airport (SIA) and \$8.5M from the SFO CAPRA. SFO Project cost does not include \$113M from SFAA for airport facilities and \$2M for San Mateo County flood control district facilities.

Capital Reserve Account for grant-ineligible expenses of SFO. Total CAPRA is \$79.2M, \$8.5M of which is included in SFO project cost.

Track One portion of project, for which potential funding sources can be identified. See additional increment in Track Two below.

III. EXTENSIONS (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 2			
Pittsburg-Bay Point to Railroad Ave. ¹⁰	104,100	0	104,100
Warm Springs extension additional grants	283,300	0	283,300
Oakland Airport Connector other grants	155,500	0	155,500
West Dublin/Pleasanton station	39,370	0	39,370
Subtotal Priority 2	\$552,670	0	\$552,670
Priority 3			
Phase 2 and 3 Extensions			
to Antioch	TBD	0	TBD
through West Contra Costa			
Coliseum within San Francisco			
through San Ramon Valley Corridor			
to Santa Clara County			
Commuter Rail ¹¹			
Subtotal Priority 3	TBD	0	TBD
Total Track Two	TBD	0	TBD

* All Track Two project cost estimates are conceptual, for planning purposes only.

¹⁰ Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

¹¹ BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State has approved BART management of the Capitol Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's extension staging policy.

Total Extensions Program (Track One & Two)	3,337,639	1,442,038	1,799,601
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NOTES:

¹⁰ All figures in thousands of dollars (three decimal places dropped).

¹¹ Figures indicate project programming, reflecting project commitment requirements.

¹² All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

III. SEISMIC RETROFIT PROGRAM (Track One)

	Total Cost	Funding to 6/30/99	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 2													
Caltrans seismic engineering study	210	0	210	210									
Seismic lifeline project	22,000	0	22,000	22,000									
Seismic safety study	3,200	0	3,200	3,200									
Transbay Tube / W. Oakland seismic joint seismic retrofit	8,000	0	8,000	8,000									
Aerial structures seismic retrofit	16,700	0	16,700		8,600	8,100							
Subtotal Phase 2	50,130	0	50,130	33,430	8,600	8,100	0	0	0	0	0	0	0
Total Track One	50,130	0	50,130	33,430	8,600	8,100	0	0	0	0	0	0	0

III. SEISMIC RETROFIT PROGRAM (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 1			
Seismic retrofit of aerial structures - Phase 1 (incl. T81 seismic joint adjustment; seismic evaluation of structures)	416,970	0	416,970
Upgrade seismic sensors systemwide	500	0	500
Subtotal Priority 1	417,470	0	417,470
Priority 2			
Seismic jack anchors & vehicle support tie-downs	400	0	400
Phase 2 Seismic Program (aerial and underground stations)	60,000	0	60,000
Seismic program for shops & computer anchoring	7,000	0	7,000
Subtotal Priority 2	67,400	0	67,400
Total Track Two	484,870	0	484,870

* All Track Two project cost estimates are conceptual, for planning purposes only.

Total Seismic Retrofit Program (Track One & Two)	535,000	0	535,000
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NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

IV. SERVICE IMPROVEMENTS (Track One)

Phase 1	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Bayfair transit center	1,000	1,000	0									0
Hayward transit center operational facility	1,282	1,282	0									0
Walrus Creek transit center	2,930	2,930	0									0
Concord transit center	1,649	1,649	0									0
Pittsburg parkside	1,656	1,656	0									0
Daly City transit center	7,504	7,504	0									0
Anti-graffiti program	580	580	0									0
System Capacity Study	784	575	209	209								0
Fruitvale transit center	2,645	2,645	0									0
Coliseum transit center	732	732	0									0
Hayward transit center canopies	1,248	900	348	348								0
South Hayward transit center	1,123	1,123	0									0
Union City transit center	2,313	2,313	0									0
Fremont transit center	2,897	2,897	0									0
PI Hill park/ride for L480/24 mitigation	879	879	0									0
Ship expansion and upgrade	23,046	1,992	21,054	10,990								0
El Cerrito Plaza transit center	420	420	0									0
Richmond transit center	1,678	1,678	0									0
West Oakland transit center	217	217	0									0
System access planning & monitoring	1,040	756	284	284								0
Pathfinder sign program prototype	204	230	0									0
Bicycle access improvement	704	704	0									0
Station area development planning (Joint Development)	1,823	1,118	705	705								0
Long range planning	4,388	4,002	386	386								0
El Cerrito Plaza access and sta. area improvement	5,500	0	5,500			5,500						0
Subtotal Phase 1	68,268	39,565	28,703	12,213	10,990	5,500	0	0	0	0	0	0
Phase 2												
Additional new bike lockers	500	0	500	500								0
Fruitvale transit village	3,080	3,080	0									0
Bay Point parking expansion	4,200	0	4,200	4,200								0
Dublin Pleasanton parking expansion	4,600	0	4,600	4,600								0
Subtotal Phase 2	12,380	3,080	9,300	9,300								0
Total Track One	80,648	42,645	38,003	21,513	16,990	5,500	0	0	0	0	0	0

IV. SERVICE IMPROVEMENTS (Track Two)			
	Total Cost	Funding to 4/30/98	Funding Requirement
Priority 2			
Additional Capacity Enhancement Program ⁽¹⁾	1,000,000	0	1,000,000
Pallander signs further implementation	500	0	500
Subtotal Priority 2	1,000,500	0	1,000,500
Priority 3			
Oakland Coliseum access and station area improvements	TBD	0	TBD
West Oakland access and station area improvements	TBD	0	TBD
Fruitvale access and station area improvements	TBD	0	TBD
Rockridge access and station area improvements	TBD	0	TBD
Balboa Park access and station area improvements	TBD	0	TBD
Subtotal Priority 3	TBD	0	TBD
Total Track Two	2,000,500	0	2,000,500
* All Track Two project cost estimates are conceptual, for planning purposes only. ⁽¹⁾ Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; additional crossovers and storage tracks; and further expansion of maintenance shop and storage yard facilities.			
Total Service Improvements Program (Track One & Two)	1,081,148	42,645	1,038,503

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

V. RESEARCH, DEVELOPMENT AND DEMONSTRATION (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Phase 1													
Electric Station Can demonstration	1,410	1,410	0										0
Electric vehicle charging kiosk demonstration	1,100	1,100	0										0
Superconducting Magnetic Energy Storage	468	468	0										0
Adaptive diagnostic systems	123	123	0										0
Sound mitigation/noise reduction program	350	350	0										0
R&D program	762	762	0										0
Subtotal Phase 1	4,243	4,243	0	0	0	0	0	0	0	0	0	0	0
Total Track One	4,243	4,243	0	0	0	0	0	0	0	0	0	0	0

V. RESEARCH, DEVELOPMENT AND DEMONSTRATION (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 2			
Sound mitigation/noise reduction program (additional)	TBD	0	TBD
Adaptive diagnostic systems (additional)	TBD	0	TBD
Storage energy (additional)	TBD	0	TBD
Traction power optimization	TBD	0	TBD
Other	TBD	0	TBD
Subtotal Priority 2	TBD	0	TBD
Total Track Two	TBD	0	TBD
* All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Research, Development and Demonstration Program (Track One & Two)			
	4,243	4,243	TBD

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

VI. OTHER FINANCIAL OBLIGATIONS (Track One)

	Total Cost	Funding to 6/30/98	Funding Requirement	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Phase 1												
C-2 car bonds, Colima reserves, Mel Center capital reserve, project development, NPS headcount, office consolidation	100,041	99,401	640	80	80	80	80	80	80	80	80	0
Subtotal Phase 1	100,041	99,401	640	80	80	80	80	80	80	80	80	0
Phase 2												
Mel Center capital reserve	240	0	240									240
Subtotal Phase 2	240	0	240	0	0	0	0	0	0	0	0	240
Total Track One	100,281	99,401	880	80	80	80	80	80	80	80	80	240

VI. OTHER FINANCIAL OBLIGATIONS (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Requirement
Priority 2			
Subtotal Priority 2	0	0	0
Total Track Two	0	0	0
• All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Other Financial Obligations Program (Track One & Two)		100,281	880

NOTES:

⁽¹⁾ All figures in thousands of dollars (three decimal places dropped).

⁽²⁾ Figures indicate project programming, reflecting project commitment requirements.

⁽³⁾ All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

59-2009
San Francisco Bay Area Rapid Transit District

CAPITAL IMPROVEMENT PROGRAM

July 1998 Through June 2009

Fiscal Years 1999 - 2009

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Enclosed for your review and comment are drafts of BART's FY99 Short Range Transit Plan (SRTP) and draft FY99 Capital Improvement Program (CIP).

As part of the process of finalizing these documents, a public meeting is scheduled to be conducted at the August 27, 1998 BART Board of Directors meeting. This meeting will begin at 9:00 a.m. in the BART Board Room at 800 Madison Street, Oakland (located directly above Lake Merritt Station). At that time, verbal comments on the draft SRTP and CIP will be accepted.

Written comments for both documents may be submitted by August 27, 1998 to the following addresses:

Draft FY99 SRTP Comments
BART, MSQ-306
Financial Planning Division
800 Madison Street
Oakland, CA 94607

Draft FY99 CIP Comments
BART, MSQ-302
Capital Budgets Division
800 Madison Street
Oakland, CA 94607

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

CAPITAL IMPROVEMENT PROGRAM

FISCAL YEARS 1999 - 2009

The preparation of this report has been financed in part through a grant from the United States Department of Transportation, Federal Transit Administration under the Federal Transit Laws, 49 U.S.C. Chapter 53 and passed through the Metropolitan Transportation Commission (MTC). This report has been prepared in conformance with MTC guidelines for Short Range Transit Plans.

The contents of this report reflect the views of BART which is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the original views or policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation, and does not preclude future labor contract negotiations or future BART Board deliberations regarding fares.

All projects discussed are subject to state and federal environmental review as required by law. Specific projects and project funding are subject to approval by the BART Board of Directors. Projects that do not yet satisfy these requirements are proposed projects.

This report was researched and prepared by:

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Department of Capital Development & Control
San Francisco Bay Area Rapid Transit District

Draft -- June 11, 1998

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

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Chapter 1

CONTEXT AND ORGANIZATION OF THE PROGRAM

Context of the Program: Progress and Challenges

Renewing the BART System

In the early 1990's, twenty years after opening for service, the BART system was at a critical point in its evolution. The original sheen of newness had worn. The passage of time and the effects of carrying a billion passengers had taken a toll on BART rail cars and stations. Many electronic and mechanical systems were approaching the end of their original design life. It was time to begin reinvesting in the physical plant to ensure continuing service quality and reliability.

Making Progress in Renovation

BART is meeting the challenge. By 1995, BART had developed an initial phase program of systemwide renovation, forecast to take up to ten years to complete, at an estimated cost of \$1.1 billion. Also by 1995, the District had developed an achievable financial plan to support the program, secured substantial grant funding to anchor it, and instituted fare increases to generate a major share of the required funding internally.

The good news for BART customers is that now in 1998, 41 of the 109 renovation projects have already been completed, and 54 more are underway, only three years into the ten-year program outlined in 1995. One of the first projects completed was the replacement of seat covers, upholstery, and carpet in 100 of BART's oldest rail cars. Eight stations have undergone a major program of intensive cleaning, painting, repairs to equipment and structures, and refurbished landscaping. All of the old bus transfer ticket dispensers in the East Bay stations have been replaced already, and the West Bay machines will soon also be replaced. Twenty-three escalators have been replaced in downtown San Francisco stations. Thirty additional faregates have been installed to improve passenger flow. Significant station security improvements have been completed. All of the old bicycle lockers have been replaced and many new ones added. Several projects to improve operational reliability have been completed. Chapters 2 and 4 present more detail on the status of the delivery of the renovation program.

On the financial front, much of the funding has now been secured, with a sound financial plan to bring the rest of the program to fruition. Changes in the financial plan since publication of the last *Capital Improvement Program (CIP)* are significant. The

\$650 million grant funding commitment in MTC's Resolution 2672 has been solidified with the programming of Section 9 and Section 3 funds within the FY06 time horizon. BART's obligation to internally generate \$200 million in supplemental funding was achieved in March 1998 with the sale of a second bond issue (the first was in 1995) dedicated primarily to system renovation. In addition, during the past year, BART and its funding partners secured additional grant commitments totaling \$47 million for the Advanced Automatic Train Control project, outside of the Res. 2672 framework. Chapter 3 presents more detail on the financial plan for renovation and other capital programs.

Remaining Challenges in Renovation

With all of the progress made in the last year in the renovation program, some challenges remain. On the program delivery side, the challenge is to optimize use of the funds that will come in over the next several years in ways that provide the maximum benefit to BART riders. The next fiscal year will see the return to service of the first cars from the original fleet which will have completely renovated interiors as well as new mechanical, electrical, and propulsion systems. Also in this next year, four more stations will undergo major interior and exterior renovation. The overhaul of elevators and escalators systemwide will begin. Major new accessibility improvements will be started (see details below). Contracts to improve the reliability of the train control and power systems will be well underway.

The remaining financial challenges include the need for BART and MTC to actually secure the grants now programmed in support of Res. 2672. BART must still make one more bond sale to contribute another \$129 million to the overall \$1.17 billion renovation program. BART must also generate a total of \$93 million in operating funds for direct allocation to the capital program during the period fiscal years 1999 through 2009.

Growing the BART System

BART has experienced an extraordinary period of growth over the past several years. System extensions to Colma, Pittsburg-Bay Point, and Dublin-Pleasanton have added 23 miles of mainline and five new stations. BART's growth program continued on both the implementation and financial fronts this year. On the implementation side, BART issued three contracts to begin construction of the extension to San Francisco International Airport (SFO) and Millbrae. Site preparation and utility relocation are already well underway. Under a second contract, engineering has begun for the trackway and associated systems. And a third contract was issued which will build the BART-Caltrain intermodal station at Millbrae. Also this past year, the Airport contracted for construction of the BART station to be located at the new international terminal. On

a dollar value basis, 92 percent of the contract costs for the extension have already been executed.

On the financial front this past year, a Full Funding Grant Agreement (FFGA) for the Airport-Millbrae extension was secured with the Federal Transit Administration (FTA), virtually guaranteeing the bulk of needed funding for this very large and important project.

Challenges for the next year include securing \$57 million in State funding to replenish the SFO project contingency, and executing the construction contracts for the San Bruno and South San Francisco stations.

Making BART More Accessible

Since opening its doors for business, BART has been one of the world's most accessible rail systems for people with disabilities. And BART is committed to continue improving the accessibility of the system. During the past year, several projects were completed to this end. These include improvements to ten of BART's most troublesome station elevators to increase their reliability. The 19 least reliable station escalators were replaced entirely (four others were replaced in 1996). The elevator at 12th Street Station was replaced with a larger model to comply with current accessibility requirements. Directional signage to assist the disabled has been installed throughout the system.

In the next year, activity will continue in several directions. A complete overhaul of all of the elevators and escalators not already replaced will get underway. Work will begin on improving and expanding accessible parking at numerous stations. The station gates through which wheelchair users pass will be modified to permit easier, unassisted passage. Many station bathrooms will be remodeled for improved accessibility. Significant new directional and information signage will be added.

Organization of the Program

This *Capital Improvement Program* is organized in two basic dimensions: program areas and funding availability status.

Program Areas

There are five major programs into which all of the approximately 200 separately listed projects are organized, and an additional category of other financial obligations. Three of the Program Areas have sub-program categories as well.

I. System Renovation

- A. Rolling Stock
- B. Mainline
- C. Stations
- D. Controls & Communications
- E. Facilities
- F. Work Equipment

II. Extensions

- A. Phase 1 Extensions
- B. Oakland Airport Connector
- C. W. Dublin/Pleasanton Station
- D. Pittsburg/Bay Point to Railroad Ave. Extension
- E. Phase 2 & 3 Extensions
- F. Commuter Rail System

III. Seismic Retrofit

IV. Service Improvements

- A. Current Planned Expansion
- B. Additional Capacity Enhancement

V. Research, Development & Demonstration

Within program areas, each project for which funding cannot yet be identified (Track Two, see below) has been assigned a priority level. Priorities range from a high of 1 to a low of 3, based on law and regulation; degree of criticality to safety, reliability of service, and/or maintenance operations; and/or service improvements.

- 1 Mandated by law or code, safety-critical, District assets jeopardized, system operations and patron service levels will be severely impacted.
- 2 System operations and patron service levels will be seriously impacted, safety-sensitive, District assets at risk, operating costs will be severely impacted, or introduction of technological

advancements which significantly improve operational performance or result in significant cost efficiencies.

- 3 Operating cost or performance levels will be affected, increased service levels or system improvements will be delayed, District goals will not be achieved.

There is also a time element involved in project priorities. Priorities as identified in this program relate to needs *at this time*. Any renovation, replacement or improvement not implemented according to scheduled need may rise in priority at a later date if deferred implementation increases the risk to operations, safety, or impact on operating costs.

Funding Availability Status

This *Capital Improvement Program (CIP)* lists all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$6.7 billion. A program of this size is currently beyond the level of funding which can reasonably be assumed to become available through existing sources over the next ten years. Therefore, in accordance with the approach being taken by the Metropolitan Transportation Commission (MTC) in its development of the 20-year *Regional Transportation Plan*, BART's CIP is divided into two "tracks", into which projects are assigned, based on the likelihood of securing funding during the next ten years.

Track One is "financially constrained" per MTC's direction, and comprises those projects that are essential to continued safe and reliable operation of the system, and for which potential funding sources can be identified. Track Two includes projects for which the projected near-term future levels of identifiable funding sources are currently inadequate. Implementation of Track Two projects would require larger allocations to existing federal, state and local programs in the future, and/or the creation of new funding sources. See Chapter 3 (Funding Strategy) for more information on funding availability for various programs.

Chapter 2

PROJECT DESCRIPTIONS

Systemwide Renovation Program

The projects and costs associated with the BART System Renovation Program are generated from replacement cycles based on the useful life of the various system components.

Rolling Stock Renovation Program

The purpose of this program of projects is to replace and renovate those components and subsystems of BART's rolling stock which have deteriorated or are susceptible to malfunctions. Aging rolling stock has high associated maintenance costs, reliability problems and is a major factor in service disruptions. Rolling stock renovation will prevent major disruption and delays in revenue service.

Projects Completed

Replace Electrical Couplers on C-1 Cars

The old "pin-type" inter-car electrical couplers were a very high maintenance item. Conversion to "button-type" couplers between cars has reduced maintenance requirements and car out-of-service time.

Replace A- and B-car Door Components

Malfunctions of the door systems on A- and B-cars were historically a major factor in service disruptions, and as such were addressed earlier than could have been accomplished through the current car renovation program. One problem was expansion of the foam comprising the door core, which then delaminated the door structures and caused the door to jam. Corroded door suspension rails also contributed to door failures.

Replace Batteries on A, B, and C-1 Cars

The transit vehicle fleet is equipped with batteries to supply power for lights and operating controls for a limited time when the C-car auxiliary power supply equipment or A- and B-car motor alternator loses electricity or fails. Good batteries allow the train to continue to the end of the line after experiencing a motor alternator electricity loss or failure. For reliable service, train car batteries need to be replaced with new batteries every 10 to 13 years. This project has helped to ensure reliable back-up power by replacing 400 aging batteries on A, B, and C-1 cars. In addition, all new batteries have been placed on a time-controlled maintenance and replacement program. Batteries will be reconditioned after 5 years of service and replaced after 10 years.

Projects Currently Underway

A- and B-Car Renovation

The renovation of the District's original fleet of A- and B-Cars is essential to enable BART to continue to provide for current and future service demand levels. The District has one of the oldest average fleet ages in the transit industry. Before commencement of the Car Renovation Program, the A- and B-Cars had never been overhauled during their 25 year life. The renovation is replacing worn out and obsolete components and returning the vehicles to their original design specifications. Systems being replaced or rebuilt include electrical, suspension, braking, coupling, heating and cooling, upholstery and carpeting. The renovation is intended to add twenty years of service life to the cars, improve their reliability, and bring them into compliance with the requirements of the Americans With Disabilities Act (ADA). The cost of remanufacturing vehicles is estimated at approximately 50 percent of the cost of new cars.

Future Projects

Track 1

Ten-Year Overhaul of C-1 Cars

The overhaul of C-1 Cars at mid-life will reduce future maintenance costs and greatly improve the reliability of the cars, encouraging additional BART ridership. This project will replace deteriorated floor panels and carpets, recondition car doors, upgrade the vehicle interiors, overhaul the propulsion control equipment and gearboxes, and overhaul and upgrade the air conditioning system.

Track 2

Install Automatic Train Control Restoration Units

Failure of the on-board vehicle automatic train control system is one of the major causes of service disruption. This project is a retrofit of the existing systems, which will provide two valuable functions. First, the new units will dramatically increase the speed with which recovery from such failures can be accomplished, thereby putting temporarily disabled trains back in service faster. Second, the new systems will capture and record critical information about failures, improving the efficiency of maintenance.

C-1 Car Renovation

The C-1 cars which went into service in the late 1980s will approach 20 years of operation by the end of this planning period. Ideally, these cars should begin a program of complete renovation, similar to that now underway for the A- and B-cars, in the 2008-2009 timeframe.

Mainline Renovation Program

The purpose of this program of projects is to replace and rehabilitate those components and subsystems of BART's mainline which have deteriorated, or will deteriorate in the next ten years, due to age and use. Many components of the trackway and traction power systems are over 25 years old, are failing with increased frequency and must be reconditioned or replaced. Mainline renovation will prevent rail and traction power failures which would cause disruption and delays to revenue service. The Mainline Renovation projects include:

Projects Completed

Recoat Tunnel Liner Rings for Corrosion Protection

The steel rings that line BART tunnels must periodically undergo heavy maintenance, including removal of corrosion encrustation, sandblasting, and a reapplication of corrosion-resistant coating. This essential work was completed recently in order to avoid further corrosion and consequent structural deterioration and weakness.

Replace Dry with Wet Standpipes

This project replaced dry standpipes with wet (water-filled) standpipes for improved fire-fighting capability and response time to increase passenger safety.

Track Embankment Upgrade

This project permanently enhanced and upgraded approximately 4600 linear feet of track embankment between the Union City and Fremont Stations. The embankment had been damaged by erosion and soil slippage. Improvements included rip-rap (large boulders) and geosynthetic reinforcement to stabilize the embankment and create positive drainage, which will prevent future damage from occurring.

Projects Currently Underway

Replace Running Rail and Accessories

This on-going project replaces curve-worn rail and switch components in high density train traffic areas. Due to the rail wear caused by the wheel-rail interface, rail and switch components in high usage areas require replacement on a three- to five-year cycle.

Rehabilitate Subway Ventilation Line Fans

This project is replacing all the old ventilation fan blades in tunnels and subways throughout the system. This work is required to upgrade the ventilation fans that are used for emergency passenger evacuation and for maintenance crews working in the

subway sections. In the past, fan failures have been experienced due to cracks that have developed over time in the blades, causing the blades to fail. An engineering analysis was conducted on all the ventilation fans throughout the system and it was determined that all the ventilation blades require replacement.

Recoat Structural Girders and Bridges for Corrosion Protection

The BART aerial structural girders and bridges are now undergoing their first complete repainting since their construction in the 1960s and early 1970s. This work is essential to avoid additional corrosion and subsequent structural deterioration and weakness.

Transbay Tube Cathodic Corrosion Protection

The steel outer skin of the Transbay Tube is protected from saltwater corrosion through the use of anodes which attract and consume corrosive elements. These anodes are currently being replaced. This Transbay Tube corrosion protection project should be done every ten years.

Replace Sump Pumps in Subway Tunnels

The sump pumps which keep BART subway tunnels dry are 25 years old and are becoming unreliable and expensive to maintain. The ability to pump water out of tunnels is critical to keeping the system safe and reliable. This project is replacing 33 aging sump pumps with new submersible-type pumps at 16 different locations system-wide. Also, oil skimmers are being installed at each sump because the effluent is pumped directly to municipal storm drainage systems.

Asbestos Abatement

The 1989 Loma Prieta earthquake damaged the asbestos insulation in train control electronics rooms at various locations around the District. These rooms can now be entered by maintenance personnel only when they are fully protected against potential asbestos exposure, making such maintenance much more difficult, time-consuming, and expensive. This project is removing the asbestos-containing material from these areas.

Traction Power Renovation

This current long-term program is rehabilitating a wide range of traction power components and subsystems that are aging and deteriorating, leading to lower reliability and higher potential for service disruption. Individual items include rectifier reconditioning and replacement of grounding systems, dielectric liquids in power transformers, traction power control batteries, cabling, switch enclosures, and gas-pressure pipes.

Replace Traction Power House Roofs

Traction power substations throughout the BART system were identified as being in poor structural condition and are currently under repair. The roofs are constructed of

steel decking and, in some cases, are rusting through. Water incursion into substations can result in traction power failures and serious service disruption.

Right-of-Way Fencing

Wherever BART tracks run on the surface at grade, the length of the right-of-way is fenced to prevent unauthorized and unsafe access to the trackway. This fencing must be replaced periodically due to normal deterioration or due to vandalism. This critical safety project is currently underway.

BART Station Renovation Program

The purpose of this program of projects is to improve the customer experience in stations by rehabilitating or replacing equipment that is worn, unreliable, obsolete, or no longer economical to clean or repair. Station Renovation Program projects include:

Projects Completed

Accessible AFC Equipment

This project has brought the BART Automatic Fare Collection ticket vending equipment into compliance with current accessibility requirements. This project added automated voice guidance to the fare-card vending machines and developed a prototype new swing gate to facilitate wheelchair access.

Station Security Program

This project has increased the illumination levels of surface parking lots, added emergency police call boxes in parking lots, and provided decentralized satellite police station structures to accommodate community-based deployment of BART police forces to increase passenger security.

Repair Concrete Roof of Lake Merritt Station

This project repaired the structurally deteriorated concrete roof and replaced the waterproofing material over a portion of the mezzanine level of the Lake Merritt Station under Oak Street. The damaged concrete roof caused water leakage in the south stairway area, making it necessary to close the stairway whenever it rained. Implementation of this repair work has restored the structural integrity of the concrete roof and now provides safe and uninterrupted passenger access between mezzanine and platform levels.

Refurbish and Install In-Storage Faregate Units

The District withdrew 30 faregate units from long-term storage and refurbished them to current standards. They were then installed at various BART locations where additional exit faregates were required due to increasing BART system usage.

Replace Bike Lockers

The original bicycle storage lockers at various BART stations had deteriorated to the point of not providing an acceptable level of security and weather protection, and have been replaced with current state-of-the-art bike lockers.

Projects Currently Underway

Automatic Fare Collection Equipment Modernization

The Automatic Fare Collection (AFC) equipment in the BART system is approaching 25 years old, is becoming obsolete and therefore is difficult and costly to maintain. This project will replace all ticket vendors, addfare machines and Cubic faregates, and recondition the IBM faregates. The project needs to be done in order to: decrease revenue collection and maintenance costs through the use of more modern servicing modules; increase revenue security and accountability through the use of sealed coin and bill units; implement an upgraded Data Acquisition System; and increase equipment availability for customers through greater reliability and maintainability. The urgency of the project is driven by the need to capture maintenance and security benefits, while avoiding deterioration of customer service levels as the existing equipment approaches the end of its useful service life. An additional need for this project stems from the regional multi-operator Translink "Universal" ticket program which will be integrated with the BART fare equipment.

Near-Term Fixes for Original AFC Equipment

The purpose of this project is to design, procure and install material and equipment to maintain operation of the original Automatic Fare Collection (AFC) equipment until the modernized AFC equipment is available to upgrade or replace the original equipment. The original AFC equipment consists of IBM equipment installed in the early 1970s and Cubic equipment installed in the early 1980s. Many assemblies which were used to maintain the equipment contain obsolete parts that are extremely difficult or impossible to obtain, even from component remanufacturers. Other components of the system are becoming extremely unreliable due to age. Still, other components in the system, such as the IBM addfare logic, are obsolete and cannot handle recent changes in AFC operational requirements (e.g., fare increases, new ticket types). This project is ensuring the District's ability to effectively collect fares.

Credit-Debit Vendors

This project is providing new fare-card vending equipment in a number of high volume stations to permit the sale of high value fare-cards with both credit and debit bank cards.

Replace and Rehabilitate Escalators and Elevators

Other than the escalators at the Embarcadero BART Station, the escalators and elevators throughout the system are the original installations. These units carry extraordinarily heavy loads, particularly in the various downtown subway stations. After 25 years of use and wear-and-tear, they are becoming unreliable, a major source of patron dissatisfaction, and uneconomical to maintain and repair on a routine basis. Several of the most unreliable escalators are being replaced, and all of the other escalators and elevators are being completely reconditioned.

Replace Maps and Signs in Stations

This project is updating and replacing outdated maps and transit information displays in all BART stations. The replacement is required to reflect the new extension stations and to update current local transit information. This project is providing a graphic display system that is more flexible and more easily updated than the old maps, which had not been updated since they were originally installed in 1972.

Replace Platform Edge Detection Tiles

The existing platform edge tiles, intended to provide a visual and tactile warning of the adjacent drop-off into the trackway pit, have been worn heavily due to normal foot traffic at many stations, and are delaminating from the platforms as well. They are being replaced so that they will remain safe, functional, and in compliance with ADA.

Repair Stair Tread Edges and Replace Anti-Slip Treatments

The anti-slip treatment originally applied to help protect patrons from slipping and falling on station stairs has worn away in many locations throughout the District. This treatment is being renewed in order to protect the safety of patrons, especially during wet weather conditions.

Key Station (ADA) Accessibility Improvements

These projects are providing federally mandated accessibility modifications to 20 Key Stations. They are designed to improve the accessibility of the existing stations for disabled persons by providing new accessible route information and signs, modifying the street elevator at the 12th Street Station, removing architectural barriers that are potential safety hazards, and meeting standards for accessible car and van parking. These projects are needed to comply with ADA requirements and to improve passenger comfort and convenience.

Replace Sewage Pumps in Underground Stations

Sewage from bathrooms in underground stations must be pumped up into the city sanitary sewer collection system. The existing pumps have been in place since the BART system opened 25 years ago. They are becoming increasingly unreliable and uneconomical to maintain. These pumps must be functional and are being replaced as a matter of patron convenience and public health.

Repair Platform Sub-Surfaces at Various Stations

Platform edge sub-surfaces are deteriorating at several stations, causing the platform edge detection tiles to lift and creating potential tripping hazards for patrons. Repairs are required constantly and are very labor intensive. The sub-surfaces are being reconstructed to allow a stronger bond for the tiles.

General Station Renovation Program

This is a multi-year program to improve the original BART stations. Restrooms are being remodeled. Surfaces are being repaired, repainted, and retiled as necessary.

Weather-protection canopies and windbreaks are being renovated as needed. Repairs are also being made to concrete walkways that have been raised and damaged by growing tree roots and ground movement, causing tripping hazards. Worn station security gates are being replaced. Irrigation systems and landscaping are being reconditioned. Fire alarm systems are being replaced or reconditioned as appropriate. General station lighting and emergency lighting systems are being relamped and upgraded.

Modify Change Machines

The District's old money changers are more than twenty years old and suffer from mechanical breakdowns and design limitations. This project is redesigning and replacing changer components to provide change to the District's patrons more reliably and efficiently.

Replace Station Roofing

The roofs of stations and weather protection canopies deteriorate with age and exposure to the elements. In order to protect patrons from potential slipping hazards, protect equipment and furnishings, and avoid structural damage, roofing is being replaced at various BART stations.

Replace Bus Transfer Ticket Machines

The bus transfer ticket machines in BART stations are increasingly unreliable, creating inconvenience for passengers who transfer to connecting bus services. This project is replacing 100 of these ticket machines. There are two basic types of machines: 65 cashless machines and 35 money-handling machines, which issue Muni transfer tickets. Ticket handling machines will be purchased using the same specifications as those for the new BART extension stations. The cash machine specifications will be developed in cooperation with Muni.

MacArthur Station Emergency Exit Upgrade

The District is obligated to ensure that station exiting times are in compliance with the standards cited in the District's 1988 agreement with the California Public Utilities Commission (CPUC). BART had been in compliance until 1995, when platform occupancy loads increased significantly due to increased ridership. This project is creating emergency evacuation paths at MacArthur Station, from the end-of-platform gates at the south end of both platforms to the gap breaker station at MacArthur Boulevard, in order to mitigate an existing safety concern. The new evacuation paths are being constructed in accordance with ADA guidelines. Based on computer models created by the BART's Safety Department, the new emergency evacuation paths will ensure compliance with CPUC standards once again.

Replace Lintel Structures on W. Oakland Station Platforms

The platform lighting systems at West Oakland Station are supported on concrete posts and lintels which are cracking and deteriorating due to vibration. This project would replace those lintels with a different type of structure less susceptible to vibration damage.

Controls & Communications Renovation Program

The purpose of this program of projects is to rehabilitate BART's controls and communications systems, including replacement of deteriorated and obsolete components and subsystems. Controls & Communications Renovation projects include:

Projects Completed

Replace Maintenance Vehicle Detection Devices

This project replaced the maintenance vehicle detection devices used in specialized high-rail maintenance vehicles. These essential vehicle detection devices allow Central Control to observe the location of on-track maintenance vehicles. They also serve as a safety device to prevent trains from entering into the work area where a maintenance vehicle is occupying mainline track. The new units replaced those which had been in service for over 24 years and which had been experiencing increasingly higher failure rates. When a failure occurred, the high-rail maintenance vehicle had to be removed from the mainline track, per the requirements of the California Public Utilities Commission, resulting in non-productive time in maintenance work schedules and the need for single tracking.

Reverse Running In Transbay Tube

In the past, older train control electronics restricted reverse running in the Transbay Tube to one train at a time. Reverse running is a critically important function for recovering quickly from service disruptions in the Tube. This modification to train control electronics provided the necessary signaling to allow up to three trains to run simultaneously in the Transbay Tube.

Replace MARIS

This project replaced the District's 25-year-old Maintenance and Reliability Information System (MARIS), which tracks maintenance needs, maintenance completed, and impacts on inventory.

Projects Currently Underway

NXTGEN Program

This project is replacing obsolete on-line operational computer control systems. The systems being replaced are the Destination Sign System (DSS) software, the Data Acquisition System (DAS), the Train Information Monitor System (TIM), and the Central Computer System (CCS). This project was needed to replace the 25-year-old computers running the DAS and DSS systems and the 15-year-old CCS computers.

Fiber Optic/ Radio Telecommunications Network (TRACS)

This project is furnishing and installing a systemwide fiber-optic and multi-frequency trunked radio network to replace the equipment used by train operations, station operations, BART Police, and maintenance forces. The old radio system had several significant shortcomings, both in terms of capacity and reliability, which had frequent negative operational impacts and occasionally would affect passenger safety. This project is being implemented through an innovative joint development program, with significant long-term revenue potential.

Advanced Automatic Train Control (AATC)

This project is currently testing, and will subsequently install, an advanced train control technology which will enable the BART system to nearly double its train carrying capacity. When implemented between Bay Fair and Daly City stations, this project will allow system throughput to increase from the current 21 trains per hour up to 30 trains per hour. The system will be installed over the existing control equipment with relative ease and no service disruptions. AATC will permit more accurate monitoring of train location, allow reduced run times and, thereby, increase the efficiency of the vehicle fleet. The project will help BART to meet the increased demands on the system, as headway reductions become necessary in the future, as well as displace significant needs for train control renovation.

Replace Workstation Consoles in Central Control

This project is replacing existing Central Control workstations that are obsolete and cannot be expanded. This project provides the display hardware, local area network (LAN) interface equipment, software, installation and testing to make the units fully functional in BART's Central Control facility.

Wayside Train Control Renovation

This is a long-term program to replace vital train control components and subsystems which are becoming unreliable due to age, and difficult to maintain due to obsolescence. Many of these components are no longer being produced or supported by the original manufacturers. If this work is not completed in a timely manner, essential train control hardware failures would lead to extensive service disruptions. This program is also replacing the Sequential Occupancy Release System (SORS). SORS is a back-up safety system required by the California Public Utilities Commission to ensure that on-line trains maintain a safe separation distance in the event of any malfunction or failure of the main train control system. The original primary SORS computer is 25 years old, obsolete, and becoming difficult to maintain. This safety-critical system must remain operational and reliable.

Second Communications Specialist Workstation In Central Control

As the new BART Extensions become operational and the number of trains on-line increases, it is necessary to create a second communications workstation from which BART communications specialists in Central Control can make essential

announcements about train movements, service disruptions, special conditions and other events that affect patrons.

Replace MetroVision Sign Units

This project replaces the MetroVision sign units in the downtown San Francisco and Oakland BART stations. These units, which display train destination and general BART information, along with commercial advertising and public service messages, are being replaced with the same type of updated dot-matrix sign units as those that are now used in the new BART Extension stations.

Facility Renovation and Replacement Program

The purpose of this program of projects is to address the deterioration of the shops and yards due to 25 years of continuous use and age, and to provide adequate facilities to store and maintain a growing fleet of revenue vehicles. Some of these projects will improve passenger transit service by improving revenue vehicle reliability through better maintenance, by reducing vehicle out-of-service time, and by keeping as many vehicles in service as possible. Some of these projects will make the shops and yards safer places in which to work, provide cost savings to the District by reducing maintenance turn-around time, eliminate travel time to and from vendors, and improve the efficiency of the shops and yards by providing employees with dependable equipment needed to perform their duties effectively. Shops & Yards Renovation projects include:

Projects Completed

Fire Main Replacement at Hayward Yard

Two fire mains had to be removed due to leaks and a subsequent increase in surface water buildup. The leaking was becoming a safety hazard and posed a serious threat to the building foundations. One of the fire mains was located beneath the shop apron slab and was replaced with an overhead pipe. This project also installed a new fire main beginning at a new street tie-in. The new main was connected to the new overhead pipe through the center of the shop to feed the existing fire protection system.

Wheel Truing Machines

This project replaced a 25-year-old wheel truing machine in the Hayward Shop. A new, second wheel truing machine was also installed at the Richmond Shop. The new, more reliable and higher capacity truing machines allow the District to go to a higher standard of preventive maintenance for wheel profiles, increase productivity, and result in lower load factors since fewer cars are being held out-of-service waiting for wheel re-profiling.

Yard Fuel Tanks

This project installed 500-gallon above-ground gasoline tanks and dispensing units at the Richmond and Hayward yards. This is an efficiency improvement which has eliminated the need to bring maintenance vehicles from these outlying yards into the Oakland Yard to refuel.

Yard Efficiency Improvements

This project reconfigured trackwork at the Richmond Shop to improve staging and routing of cars.

Projects Currently Underway

Hayward Shop Traction Motor Repair Facility

This project is renovating the Hayward shop and replacing old shop maintenance equipment. This renovation is necessary to keep up with increased demand, will result in increased productivity, and will reduce the time cars are held out of service for repairs.

Replace Dust Collector Systems at the Richmond & Concord Shops

This project is bringing the Richmond and Concord blow-pit ventilation systems into compliance with CalOSHA regulations regarding employee exposure to airborne contaminants as well as renovating the shop's heating and cooling systems.

Employee Facilities Improvements

Prior to this year, the infrastructure of employee worksites in the maintenance shops, training facilities, warehouses, and the Cash Handling Building had not changed substantially since the BART system opened. This project is providing basic essential reconditioning and remodeling as needed to create acceptable work environments.

Overhaul Transit Vehicle Washers

Until recently, the facilities used to wash the exterior of transit vehicles were still the original system installations. They were becoming increasingly inefficient, and did not comply with current standards for containment and treatment of chemical-laden waste water. This project is bringing the vehicle washers back up to full operations, and also providing waste water controls.

Richmond Yard Security Enhancement

Richmond employees have become increasingly concerned with their safety while working in the Richmond shop and yard. Although no District employees have been targeted, stray bullets have hit several buildings. This project will enhance personnel safety by improving specific features at the Richmond Yard Facility, including the entry gates, access roads, fencing, and lighting.

Reconfigure and Renovate Transportation Buildings

These buildings, located at the train dispatch yards, provide the essential administrative facilities for on-site train operations, as well as lunch/break rooms, locker rooms, and other support facilities for on-duty train operators. These buildings are being reconfigured to serve the increased number of operators required to provide the higher service levels associated with the new system extensions. At the same time, the existing structures are being reconditioned and remodeled as necessary.

MetroCenter Building Fuel Tank

The old 4,000 gallon fuel tank located in the parking lot of the MetroCenter Building, which provides fuel for the emergency generator located on the roof of that building, is

no longer in compliance with regulations for underground fuel storage. BART is replacing the tank.

1000 Volt Shop Power Supplies

The increase in the number of cars in the BART fleet, and the increased number of trains dispatched from the Daly City and Richmond Yards, has increased the number of cars requiring maintenance at these shops. Purchasing an additional 1KV power supply for each of these shops will give maintenance the flexibility of troubleshooting and repairing two cars simultaneously within the same shop.

Replace Parts-Washing Facilities in All Shops

This project is replacing parts-washing facilities in all shops so the District will comply with environmental requirements. Parts-washing waste water needs to be specially handled to meet environmental discharge laws. The District will be subject to citations and a possible shutdown of facilities, if found not to be in compliance.

Non-Stock Inventory (repairable parts provisioning)

This program maintains adequate inventory of all high-value repairable parts in support of transit vehicles, station and field equipment, and automatic fare collection equipment. Failure to provide for these requirements could lead to vehicles being out-of-service and disruption in maintenance and service operations. This on-going need must be funded annually.

Future Projects

Track 1

Replace Roofing On Shops and Towers

The roofs of the shops and towers protect personnel and equipment from exposure to the elements. These roofs must be replaced periodically as they deteriorate due to age and exposure.

Track 2

Central Receiving and Distribution Warehouse Facility

The District is facing an increased need for inventory of materials as the new system extensions are coming on-line, the size of the operating fleet increases, and parts are stocked for A- and B-cars as configured both before and after renovation. A new, modern central receiving and distribution warehouse facility would meet these needs.

Recondition Shop Cranes

The existing heavy maintenance cranes located in the East Bay shops are still the original installations. Safe operation of these lifting units must be assured through periodic reconditioning.

Work Equipment Program

The purpose of this program is to replace worn and obsolete maintenance vehicles, service vehicles, and maintenance equipment. The equipment includes such items as tools, power generator sets, light towers, ground and building maintenance equipment, shop equipment, test instruments, light-duty highway vehicles, BART police vehicles, and heavy-duty maintenance vehicles (diesel trucks, tractors, and track maintenance vehicles).

BART's maintenance equipment gradually becomes worn from frequent use. Eventually, it becomes more economical to replace the old equipment rather than repair it. The ongoing equipment replacement program assures that old, worn out equipment is replaced in a timely manner to minimize overall costs and ensure personnel safety. If this equipment is not replaced, overall costs will increase, maintenance crews will be disrupted by failed equipment, and service to patrons will deteriorate.

Extensions Program

Phase 1 Extensions

The purpose of the Phase 1 Extensions Program is to expand the BART rail system to areas not yet directly served by rail, but where extension commitments have been made. The areas include eastern Contra Costa and Alameda Counties, southern Alameda County, and northern San Mateo County. This program includes project planning and environmental review; property acquisition; design and construction of fixed facilities; design, procurement and installation of systems elements; and the purchase of vehicles.

Projects Completed

Castro Valley and Dublin/Pleasanton

This project, which opened in May 1997, is a 13.8-mile double-track, new branch line extension to the original BART system. It begins with a connection to the existing Fremont BART line just south of the Bay Fair Station in San Leandro and continues eastward in the median of the I-238 and I-580 freeways to the end of the project at Dublin-Pleasanton. Currently, there are two stations on this extension: one in Castro Valley located at I-580 and Redwood Road, and a second station in East Dublin-Pleasanton near Hacienda Business Park. A third station at West Dublin-Pleasanton near Stoneridge Mall will be added when funding has been secured.

North Concord/Martinez and Pittsburg/Bay Point

This project is a 7.8-mile double-track extension, having two stations. It runs north from the existing Concord Station to a new North Concord-Martinez Station and then east along Route 4 to a Pittsburg-Bay Point Station. Additionally, improvements were made to the existing Concord Yard to increase operating efficiency on the extended line. The North Concord-Martinez Station opened in December 1995. The further extension to Pittsburg-Bay Point opened in December 1996. This project will be extended to Railroad Avenue in Pittsburg when funding is secured.

Colma

The Colma Extension, which opened in February 1996, added a new station, parking garage, and bus transfer facility approximately one mile past the Daly City Station. This project has relieved access and traffic circulation problems at the Daly City Station and has provided additional BART system access via I-280 and Route 1. It is also the first leg of the extension to San Francisco International Airport, which is now under construction.

Projects Currently Underway

San Francisco Airport

The San Francisco Airport Extension will extend the BART system further into San Mateo County from the new Colma Station to a station at San Francisco International Airport, with three other stations at South San Francisco, San Bruno, and Millbrae. When completed, this extension will help to reduce Bay Area-wide traffic congestion, improve air quality and provide a convenient, cost efficient intermodal transportation link between BART, CalTrain, West Bay communities, and East Bay communities.

Future Projects

Track 1

Warm Springs

The Warm Springs Extension, as currently defined, would extend 5.4 miles of double track from the existing Fremont Station, continuing southward in the railroad corridor and terminating at the Warm Springs Station just south of Grimmer Avenue in Fremont. An intermediate station is planned at Washington Boulevard in the Irvington District.

Oakland Airport Connector

The Oakland Airport Connector Project would directly connect the BART Oakland Airport/Coliseum Station with the Oakland Airport terminals, providing improved transit service for air travelers and air terminal employees. BART has completed an FTA-supported feasibility study as the first phase of the Suspended Light Rail Technology Pilot Project. Other technologies and funding sources are also being evaluated.

Track 2

West Dublin-Pleasanton Station

The Dublin-Pleasanton Extension currently includes two stations: one in Castro Valley and a second station in East Dublin-Pleasanton near Hacienda Business Park. Although both of these stations opened as recently as May 1997, the East Dublin-Pleasanton Station is already so heavily utilized that the parking lot is full by mid-morning. Also, for many commuters living in the Dublin-Pleasanton area, this station is in the opposite direction from their homes as the direction of their commute. The original plans for the Extension therefore called for a third station at West Dublin-Pleasanton near Stoneridge Mall. In addition to including parking and a bus transfer facility, this station might also include adjacent commercial and office development on BART property.

Phase 2 and 3 System Extensions

The BART capital program includes the future planned extensions to Antioch, Livermore, northwestern Contra Costa County, the San Ramon Valley, the South Bay, and other corridors. BART will continue working with these communities, and will pursue funding for further planning and development of these projects. However, funding constraints indicate that their implementation will not be likely within the timeframe of this current BART capital program.

Commuter Rail System

Another approach to providing high-quality rail service to some of the planned Phase 2 and 3 extension corridors faster than the BART system itself can be extended, is traditional commuter rail. BART has completed evaluations of several possible new commuter rail lines to serve these corridors (and beyond). This commuter rail program could add more than 200 miles of passenger rail service to the regional rail network. The program identifies a comprehensive service plan that would provide a near-term commute alternative, including critical intermodal connections, to alleviate bottlenecks in some of the most heavily congested commuter corridors in the Bay Area.

Seismic Retrofit Program

The purpose of this program of projects is to bring the existing system up to the latest seismic standards to enhance the system's ability to safely endure maximum credible earthquakes and quickly return to service by:

- Improving the structural strength of BART's aerial structures and Transbay Tube joints in order to withstand greater seismic forces.
- Improving the system of seismic detectors which slows or stops trains in the event of an earthquake.
- Installing automatic seismic gas shut-off valves.
- Providing engine-generators for the event of a possible PG&E power loss.
- Providing restraints for overhead crane structures at maintenance shops.
- Providing tie downs for the stands that support transit vehicles during maintenance at the shops.

BART has 160 aerial structures with 438 piers and abutments being considered for retrofit. BART also owns 149 bridges crossing over local streets and roads. Negotiations with Caltrans are underway to determine the appropriate design criteria for these structures and to establish a workplan for seismic evaluation and retrofit.

The structural strengthening of project components will bring existing structures up to current seismic standards, and improve the ability of the system to withstand major earthquakes with little or no damage. Other components of this project will augment earthquake preparedness systems already in place to provide more coverage, more detailed and accurate information, and to permit faster response to protect the safety of the rail system, its patrons and employees.

Phase 1 of the proposed Seismic Retrofit Program will consist of retrofitting BART's Lifeline: the operational line segments that link up strategic points that serve the highest numbers of patrons. These segments extend from Rockridge to San Francisco/Daly City and from Downtown Berkeley to the Coliseum. Phase II will retrofit the segment of the Fremont Line extending from the Coliseum to the South Hayward Station, which will protect the service connection to the Dublin-Pleasanton Line and access to the Hayward Yard. Phase III will retrofit the remaining segments of the system.

Service Improvements Program

The purpose of this program of projects is to improve passenger services and system capacity at BART stations and shops by building intermodal transit centers, bicycle facilities, transit villages, and other passenger service, system capacity, and station improvements.

Projects Completed

Hayward, Bay Fair, Concord, Walnut Creek, and Daly City Transit Centers

All of these projects are now operational. They improve traffic circulation in the vicinity of the stations, and improve the patron experience by providing upgraded bus waiting and loading areas, weather protection and other amenities.

Anti-Graffiti/Vandalism Task Force

This project utilized increased public awareness, plainclothes police enforcement, CCTV-VCR surveillance systems, and inter-agency cooperation to combat graffiti and vandalism systemwide.

Projects Currently Underway

Additional Transit Centers

BART and AC Transit have entered into a Memorandum of Understanding in which AC Transit will pass federal Section 9 funds through to BART to fund construction of transit centers at El Cerrito Plaza, Richmond, Fruitvale, Fremont, South Hayward, Coliseum/Oakland Airport, Union City, and West Oakland Stations.

Fruitvale Transit Village

BART is working with the Spanish Speaking Unity Council (SSUC) on two components of the Fruitvale Transit Village: the childcare facility and the pedestrian plaza. The child care facility will accommodate approximately 200 children and will enhance and encourage the use of public transit at the Fruitvale Station by providing a service to patrons of both BART and AC transit. The plaza will consist of a 20-25,000 square foot public pedestrian plaza on the current site of a BART parking lot on the east side of the Fruitvale station. The City of Oakland is in the process of securing state funds in order to build a structure for replacement parking. The pedestrian plaza will visually enhance the Fruitvale Station, provide a pedestrian link from the Fruitvale station area to planned and existing jobs and services, and improve pedestrian access to BART and AC Transit. Surrounding the pedestrian plaza site, the SSUC will construct a transit-oriented project which will feature community facilities and services, including the childcare facility, a community resource center, a health clinic, and a

senior center. The project as a whole is also intended to leverage private investment in the development of retail and offices.

Expand the Concord Shop

The increasing size of the operating fleet required that the heavy maintenance facilities at the Concord shop be reconfigured, renovated and expanded in order to increase its efficiency adequate to properly maintain the expanded fleet. This expansion is also essential to reduce the amount of time cars are held out of service for maintenance and repairs.

Future Projects

Track 1

Expand Shop Capacity

The increasing size of the operating fleet requires that the heavy maintenance facilities at the Hayward shop, or a location to be determined, be reconfigured, renovated and expanded in order to increase shop efficiency to a level adequate enough to properly maintain the expanded fleet. This expansion is also essential to reduce the amount of time cars are held out of service for maintenance and repairs.

El Cerrito Plaza Access and Station Area Improvement

Contra Costa County Measure C provides \$5.5 million in funding for BART patron parking expansion at the El Cerrito Plaza Station. BART and the City are currently cooperating to determine the exact nature of this project. The scope, cost and schedule of this project will be finalized upon completion of that effort.

Station Area Joint Development

BART staff are working with various communities and private developers to facilitate the creation of transit-oriented development at certain stations. Such development will improve pedestrian access to stations and provide services, jobs, and housing within easy walking distance of stations, thus attracting more patrons to BART, including off-peak riders and reverse commuters. BART staff are currently working with local jurisdictions on various station area studies to promote transit-oriented development at and around the following BART stations: Union City, Concord, Pleasant Hill, El Cerrito Plaza, 16th Street/Mission, and 24th Street/Mission. BART is also working with communities to create Specific Plans for transit-oriented development at the following stations: Pittsburg/Bay Point, Millbrae and Coliseum. In addition to its planning activities, BART is in the process of securing developers for the West Dublin/Pleasanton, MacArthur and Richmond Stations. Local jurisdictions are working closely with BART on development at two other stations. At the Hayward Station, the City is negotiating a land swap with BART so that it can facilitate the construction of housing as a supplement to previous station area development. At the Ashby Station,

the City of Berkeley holds the air rights over the station parking lot, so BART staff are working with the City and the City's selected developer to pursue a development project. Finally, two projects are past the planning and solicitation phases. One is the Fruitvale Transit Village project, which is nearly ready for construction. The other is located at the El Cerrito Del Norte Station, where BART has entered into an Exclusive Negotiating Agreement with a housing developer.

Bike Program

This project would improve bike access to BART by providing day-use bike lockers and other bicycle parking facilities at BART stations.

Track 2

16th Street/Mission Station Plazas

The plazas at the 16th Street/Mission Station function as important transfer centers for passengers connecting between BART and Muni. Over the years, however, these plazas have become a source of neighborhood concern over such issues as security, aesthetics, and public amenity. In response to this concern, BART and the Metropolitan Transportation Commission have sponsored a series of community workshops led by Urban Ecology, an environmental advocacy organization, and Mission Housing, a local developer of affordable housing. The product of these workshops is the Community Design Plan, which establishes a blueprint for creating a safer and more active and vibrant public space at the 16th Street/Mission Station. If implemented, this project would include additional trees and benches, new bus shelters, a more formal entryway to BART, and possibly other amenities.

Oakland Coliseum Intermodal Project

This project would create a multi-modal transportation hub to facilitate transfers and access to services for users of BART, AC Transit, private shuttle buses, the proposed BART/Oakland Airport Connector, Capitol Corridor rail service, the Oakland Coliseum Complex, and the surrounding commercial and residential developments. It would include improvements to the pedestrian bridge which links BART, the Coliseum, the planned Capitol Corridor rail station, and the proposed Airport Connector; accessibility improvements; bus intermodal improvements; improved vertical circulation and other BART station modifications; and security improvements.

West Oakland Access and Station Area Improvements

This project is still in the planning stage. It would be constructed near the Cypress Corridor freeway and an area that is being considered for inter-city rail service. The scope, cost and schedule for the project is subject to the results of the various planning studies.

Additional Capacity Enhancement

The basic program of capacity enhancement projects listed as individual projects in this *Capital Improvement Program* is intended to accommodate anticipated patronage growth. The Service Improvement program area also includes this Additional Capacity Enhancement subprogram which would go well beyond the basic program, to accommodate substantial growth. The Additional Capacity Enhancement subprogram is conceptual and still under development, but it would include additional transit vehicles; additional traction power and train control renovation and upgrades; other reliability improvements; improved station circulation and access; and further expansion of maintenance shop and storage yard facilities beyond the projects listed separately in this *Capital Improvement Program*. The cost indicated for this item provides a preliminary estimate of what these additional improvements might entail.

Research, Development & Demonstration

Projects Currently Underway

Electric Station Cars

The District is conducting a demonstration program and has purchased 45 electric cars that are being used by BART and PG&E employees for access to and egress from stations. The project is demonstrating that, with "station cars," transit can provide an all electric door-to-door service that will attract new patronage.

Superconducting Magnetic Energy Storage (SMES)

Two related projects are studying the technical and economic feasibility of utilizing SMES technology to minimize voltage sag problems in critical locations in the system. Addressing the voltage sag problem is critical to plans to operate trains at closer headways to support projected future service levels. Two different approaches are being pursued. A Federal Transit Administration (FTA) grant is currently funding a study to evaluate the feasibility of applying SMES to the BART system. Other possible approaches being considered for investigation include cryogenic power converters to control voltage output of existing substations and high temperature superconducting materials.

Chapter 3

FUNDING STRATEGY

BART's *Capital Improvement Program (CIP)* includes all of the projects which the District would implement if adequate funding were available. The entire program totals almost \$6.7 billion. Of this total, the Track One program at a cost of \$4.1 billion is comprised of those projects for which potential sources of funding can be identified. The \$2.6 billion balance of the program, Track Two, serves as the basis of advocacy for increased levels of capital funding.

A summary of BART's Track One funding needs is provided in Table 1. A summary of the proposed funding sources for Track One is provided in Table 2. Details on all Track One and Track Two funding needs are shown in Chapter 4.

Systemwide Renovation Program

For 20 years after the inception of rail service in 1972, BART was considered new and state-of-the-art. Reliability improved steadily even as service levels increased. By the early 1990's, however, the effects of aging began to show up. It became apparent that stations, rail cars, and the basic system infrastructure would soon need more than just routine maintenance to continue operating reliably at increasingly higher levels of service. In 1993, BART evaluated the condition of the physical plant and developed a \$1.1 billion initial phase program of renovation projects needed to return the system to near-original design standards.

In 1994, as the magnitude of the program became known, BART and the Metropolitan Transportation Commission (MTC) began discussions on how to fund this initial program of critical renovation needs, resulting in joint adoption of MTC Resolution 2672. The CIP that BART adopted in January 1995 outlined a set of projects and a funding strategy to implement a multi-year program of rebuilding, for which Resolution 2672 and a series of planned BART bond issues formed the foundation of the program at a \$650 million funding level. Other grants and BART funds are anticipated to fund the remainder of the need.

Generation of Grant Funds

In May 1994, BART and MTC jointly adopted a cooperative funding agreement (MTC Resolution 2672) to address BART's most critical renovation needs. The agreement calls for MTC to program \$450 million in federal, state, and regional funds for BART renovation, and for BART to generate \$200 million as local match to the proposed grant funds.

The grant funding plan originally set forth in Resolution 2672 anticipated MTC programming its entire \$450 million commitment over the six-year period FY 1994 through FY 2000. Subsequent reductions in Congressional appropriations of transit system funding have led MTC to extend its forecast of funds expected to be available to the Bay Area region, and therefore to BART, over the period of this CIP. MTC's current funding projections for BART extend to fiscal year 2006. For example, annual programmed amounts of Section 3 funds for renovation of the A- and B-cars have been changed from the original plan, with the receipt of the full amount of programming consequently extended from FY 2000 to FY 2003. Section 9 programming for other renovation projects extends to FY 2006.

Since the adoption of Resolution 2672, BART and MTC have continued to jointly pursue additional grant funding for the balance of the renovation program above the \$650 outlined in the Resolution. As the financial program has evolved, grant sources will make up more than the \$450 million identified in Resolution 2672.

Generation of BART Funds

The CIP adopted in January 1995 (FY 1996-05) outlined the need for BART to issue bonds to match and supplement grants for the Systemwide Renovation Program. That CIP proposed bond issues for the spring of 1995, 1997, 1998 and 1999 to generate a total of approximately \$400 million. The source of debt service funds for this planned borrowing was proposed as a series of fare increases in 1995, 1996 and 1997 to fund the first \$200 million in bonds (as local match to the Resolution 2672 grant funds), and future revenue enhancement and/or cost reductions to fund the last \$200 million. The first three fare increases have been implemented as planned. BART has now more than met its Resolution 2672 match commitment.

The first bond issue was sold in May 1995, netting \$130 million. The second bond issue was not needed as early as forecast in the 1995 CIP, and was sold in March 1998, combining the planned 1997 and 1998 issues. This produced \$218 million for capital projects, of which \$130 million was for renovation. In combination, therefore BART has generated \$260 million for renovation, exceeding the required commitment under Resolution 2672 by \$60 million. Financial projections carried in the companion document *Short Range Transit Plan (SRTP)* indicate that the combined debt service for the 1995 and 1998 bond issues can be sustained with the revenue produced by the series of three fare increases already implemented. The proceeds of the 1995 and 1998 bond issues are being used to provide local match for Resolution 2672 renovation grants and other renovation projects. The balance of the 1998 bond funds are being used for the retirement of previous debt for the purchase of C-2 cars and the telecommunications project. The last of the bond issues outlined in 1995, required to complete the A/B Car Renovation Program, is currently expected to be issued in FY 1999 in the amount of \$129 million.

In addition to the bond issues, the funding program has for several years included direct allocations from the operating budget to capital. The original funding program included \$76 million to be generated for capital in this manner over the period fiscal years 1995 through 2005.

This year's CIP provides for making additional allocations from operating, in the amount of another \$32 million, bringing the total to \$93 million over the period of fiscal years 1999 through 2009. The renovation of BART's C-1 vehicles is programmed to be funded with \$10 million of capital allocations from the operating budget in fiscal years 1999 through 2003. Some of these additional capital allocations will also be used to replace work equipment and provide repairable inventory in the period fiscal years 2007 through 2009.

Funding Strategies by Program

As noted above, BART has defined a program of essential renovation requiring \$1.17 billion between inception of the program adopted in 1995 and the end of this CIP timeframe (FY 2009). The proposed funding sources are summarized in Table 2. Details for several major elements of the program are described in the following section.

A- and B-Car Renovation Program

The largest single component of the systemwide renovation program is the rebuilding of the original fleet of A- and B-cars to extend their useful lifetimes. The budget for this effort is \$454,400,000. The funding program jointly adopted by BART and MTC for this project includes the programming of \$239.5 million in federal Section 3 funds, \$30 million in federal STP and CMAQ funds, almost \$17 million in state Proposition 108 and TCI funds, and \$24 million in bridge toll funds. The funding plan requires BART to provide the balance of the funding, or approximately \$144 million. To date, BART has committed \$8.3 million. The rest of BART's commitment will come from the \$129 million 1999 bond issue and other BART reserves.

The funding plan for this project is covered by a Federal Transit Administration (FTA) Letter of No Prejudice (LONP), which permitted BART to execute a contract for performance of renovation work in advance of actual receipt of most of the grant funds. The contract is comprised of a base order for renovation of the first 200 cars, fully covered by the LONP, and an option for the remaining 239 cars as additional funding becomes available. The deadline for executing the option is May 1999. This CIP forecasts availability of funding and execution of the option in FY 1999.

Other System Renovation Projects

Renovation of the remainder of the BART infrastructure (stations, power and train control systems, maintenance facilities, etc.) is being accomplished through a variety of funding sources. Through Resolution 2672, MTC has pledged to program \$140.8 million, to be matched by \$56.6 million from BART. That \$56.6 million is being provided from the proceeds of the 1995 bond sale. Other grant sources and BART revenues are programmed for the remaining balance. Detail on the funding program for several large projects is provided below.

Automatic Fare Collection (AFC) Equipment Modernization

After 25 years in service, BART's AFC equipment must be modernized through a combination of replacement and renovation. This project is currently estimated to cost \$77.8 million. As part of MTC's Resolution 2672 commitment, \$8.1 million in federal Section 9 funds are forecast to be granted to the project by the end of FY 1998. Current MTC programming identifies an additional \$16.5 million in Section 9 funds to be granted in FY 1999. Additional grant funds will be sought, and BART revenues will be required to provide local match and supplemental funding to grants.

Rail Replacement

As train wheels grind against rail, especially on curves, the rail gradually wears away and must be replaced. This is a major, ongoing effort estimated to cost \$37 million by FY 2006. MTC programming under Resolution 2672 includes \$4 million in federal Section 9 before the end of FY 1998, and annual increments totaling an additional \$21 in Section 9 by FY 2006. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Traction Power System Renovation

Traction power is the electricity that operates the motors that propel BART trains. The power system includes rectifiers, circuit breakers, cabling, and other components that have deteriorated with use and the passage of 25 years of service. This deterioration poses risks to reliable service delivery. BART has already allocated \$10 million in bond funds to begin this major project. MTC programming under Resolution 2672 includes a total of \$14.1 million in Section 3 funds over the period of FY 2004 through FY 2006 to continue the project. Bridge toll funds or BART revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Wayside Train Control System Renovation

The electronic components and circuitry that control the speed and switching of trains was state-of-the-art when the system opened for service. But many of these critical parts are now worn, unreliable, obsolete and very costly to maintain. This project will replace components and subsystems as necessary to keep BART train control safe and reliable. BART has already allocated \$4.8 million of bond issue funding to initiate the project. MTC programming under Resolution 2672 includes a total of \$35.2 million in Section 9 funds over the period FY 1999 through FY 2006. Bridge toll funds or BART

revenues will be required to provide local match and possible supplemental funding to these periodic grants.

Advanced Automatic Train Control

This project is integral to BART's proposed future service plans, and also will reduce the need for a significant amount of renovation that would have been required on the existing train control system. The research and development phase is being carried out with a combination of federal defense conversion funds, matched by private sector and BART funds. Grant funding in the amount of \$47.1 for implementation of AATC on the M- and upper A-lines has been programmed by MTC from state and federal sources. BART will need to generate the local match to this grant.

Escalator and Elevator Program

Replacement of many of the most critical station escalators, and complete renovation of other escalators and station elevators systemwide, are among BART's highest priority renovation programs. These programs, totaling over \$50 million, have not competed well for grant funds in the past, so these efforts are expected to be carried out primarily with BART revenues. Grant sources will continue to be pursued as possible, but these projects must be carried out immediately, and are being funded from BART sources as necessary to keep them moving.

Other Programs

Additional renovation funding needs beyond what can currently be reasonably forecast to become available are also presented in this CIP, at a conceptual planning level. The Track Two renovation program comprises projects which would be highly desirable to accomplish within the next ten years, but which are not at this time considered essential to reliable operation of future service levels within that timeframe. The Track Two renovation program is estimated at \$695 million, including continued facility and C-1 car renovation.

System Extension Program

From the earliest days of its planning, the BART system has been envisioned by many as an expansive network of lines which ultimately would link most of the counties in the greater San Francisco Bay Area region. Limitations on funding restricted the original construction to 72 miles of double track in San Francisco, Alameda, and Contra Costa counties. But plans for extension of the original system continued to be considered throughout the 1970's and early 1980's.

In the mid-1980's several Bay Area counties began to explore the possibility of funding various transportation improvements, including BART extensions, through increases in sales taxes. BART was granted significant funding from sales taxes in Alameda and Contra Costa counties, and from state and other sources, for extensions in those two counties. In Contra Costa County, an extension from the former end of the line at Concord now continues to new stations at North Concord-Martinez and Pittsburg-Bay Point. In Alameda County, the new branch line from Bay Fair Station to Castro Valley and Dublin-Pleasanton was built. Federal grants were simultaneously secured for an extension to Colma Station in San Mateo County. All of these projects have entered service in the last three years.

San Francisco International Airport--Millbrae Extension

The next major planned extension of the BART rail system is from the new Colma Station to San Francisco International Airport and the city of Millbrae. A Full Funding Grant Agreement (FFGA) was secured for this project in June 1997, solidifying its status in Track One. The funding plan for this project includes the following major elements: \$750 million in federal Section 3 funds; state funds totaling \$108 million; \$10 million in regional bridge tolls; \$200 million from the Airport; and \$99 million from San Mateo County. In addition, the District will provide a \$79.5 million Capital Reserve Account (CAPRA) for potential grant ineligible expenses associated with the project. The CAPRA will be generated through \$7.5 million in direct allocations from operating sources to be made in FY 1998 and FY 2000, and a dedicated bond issue of \$71.7 million planned for FY 2001.

Warm Springs Extension

This planned \$546 million extension, as reflected in this CIP, would extend from the current end of line at Fremont Station to two new stations at Irvington and Warm Springs in southern Alameda County. This project is listed partially in the Track One program in the amount of \$263 million based on existing regional funding commitments from a variety of sources. The \$283 million balance of the project cost is listed in Track Two pending identification of additional funding sources.

Oakland Airport Connector

This planned \$129.9 million extension would extend in an aerial alignment from the existing Oakland Airport-Coliseum Station to Oakland Airport, in Alameda County. This project is listed partially in the Track One program in the amount of \$4 million to be funded from the 1998 STIP for preliminary engineering and environmental work. The \$125.9 balance of the project cost is listed in Track Two pending identification of additional funding sources.

West Dublin-Pleasanton Station

This planned \$39.4 million project would build the third station originally planned for the Castro Valley-Dublin/Pleasanton Extension, in Alameda County. This project is listed in the Track Two program. A negotiated procurement process is currently being implemented to identify and analyze potential funding mechanisms, including potential real estate development opportunities, for the construction of the station.

Pittsburg-Railroad Avenue Station

This planned \$200.1 million project would extend the new Pittsburg-Bay Point segment further east in Contra Costa County, to a new station at Railroad Avenue. A portion of this project is listed in the Track One program on the basis of remaining funds from the initial Measure C along with other funding sources. BART will continue to seek funding for the balance of the project, which continues to be listed in Track Two.

Seismic Retrofit Program

The original BART system was built in the late 1960's to standards far in excess of building codes in existence at that time. BART survived the major Loma Prieta earthquake of 1989 with only very minor damage, and returned to full service in a matter of hours. Since the 1960's much has been learned about how large structures such as BART facilities perform in major seismic events. Upgrades are now known to be technically feasible which would allow the system to withstand major earthquakes in the immediate vicinity of BART structures with the ability to resume service in a minimum amount of time.

At this time, the bulk of the \$311 million Seismic Retrofit Program is listed in Track Two pending identification of funding sources. A first increment in the amount of \$22 million is listed in Track One, based on negotiations currently underway with Caltrans for possible state funding to retrofit portions of the BART system which cross over Caltrans-maintained streets and roads.

Service Improvements

BART and AC Transit have entered into a Memorandum of Understanding through which AC Transit is passing through to BART federal funds and local match for construction of intermodal transit center improvements at eight stations. The Bay Area Air Quality Management District last year provided funds for the \$704,000 program to improve the quality of bicycle access to BART stations. Additional Air Quality grant funds will be pursued to expand opportunities for bicycle access to the system. A combination of BART and grant funds are supporting prototype development and initial deployment of a "Pathfinder" sign program to help patrons find their way between stations from nearby facilities. Funds are programmed to implement expansion of Concord Shop maintenance facilities (\$14.6 million) and an additional \$8 million is identified for the initial phase of similar expansion of shop facilities elsewhere in the system, at a location to be determined by a study currently underway.

In addition to all of these Track One Service Improvement projects, this CIP also includes several proposed Track Two projects, including further deployment of the Pathfinder sign program, possible station area improvements at the 16th-Mission Street station in San Francisco, traction power system upgrades, and other projects which could significantly improve BART operations and/or expand BART capacity.

Research, Development and Demonstration

BART continues to work in various R&D areas with prior grant funds, including Station Cars and Superconducting Magnetic Energy Storage. Prior allocation of BART funds are being used to study possible advances in Adaptive Diagnostic Systems for improved transit vehicle reliability and faster, more efficient vehicle maintenance. BART will continue to seek grant funding for technological advances from specialized sources for which basic system renovation and expansion are not eligible.

Track One Program -- Funding Needs

All figures in thousands of dollars (three decimals places dropped)

Project	Total Cost	Funding to 6/30/98	Funding Req'd	1999	2000	2001	2002	2003	2004	2005	2006	2007-09
SYSTEM RENOVATION PROGRAM												
Rolling Stock- Phase 1	454,400	300,717	153,683	153,683								0
A & P car renovation	10,814	10,814	0									0
Other rolling stock renovation projects	465,214	311,331	153,683	153,683	0	0	0	0	0	0	0	0
Subtotal												
Rolling Stock- Phase 2	10,000	3,000	7,000	2,000	2,000							0
C-1 car mid-life overhaul												
Subtotal rolling stock	475,214	314,331	160,683	155,683	2,000	1,000	0	1,000	0	0	0	0
Mainline- Phase 1	37,012	10,559	26,453	3,061	3,078	3,158	3,240	3,324	3,410	3,529	3,653	0
Replace rail	3,328	3,328	0									0
TBT cathodic corrosion protection	3,306	3,306	0									0
Replace surge pumps in subway tunnels	5,280	5,280	0									0
Asbestos abatement (Phases 1-4)	27,655	10,000	17,655	3,277	3,000	3,000	2,514		5,684	5,883	6,088	0
Rehab traction power equipment	30,839	19,846	10,993	6,338	6,078	6,158	5,754	3,324	9,094	9,412	9,741	0
Other mainline renovation projects	107,400	51,301	55,999									0
Subtotal mainline												
Stations- Phase 1	71,776	3,620	74,156	53,552	5,201	5,286	4,435	4,051	1,631			0
AF- modernization/Translink	12,121	12,121	0									0
Replace 19 station escalators	26,040	25,540	2,500	2,500								0
Escalator overhaul	10,595	6,409	4,186	4,186								0
Elevator overhaul	65,711	15,378	50,333	11,500	5,130	5,263	5,400	5,540	5,684	5,832	5,964	0
Stations general renovation	1,713	1,713	0									0
Energy conservation (Embarcadero Station)	31,079	25,129	5,950	5,150								0
Other station renovation projects	227,035	89,910	137,125	76,888	10,331	10,549	9,835	10,391	7,315	5,832	5,964	0
Subtotal stations												
Controls & Communications- Phase 1	19,226	19,226	0									0
NXTGEN (Non-Extension Funded)	65,000	65,000	0									0
Fiber optic/radio network (TRACS)	102,600	37,600	65,000	5,900	15,000	30,000	14,200					0
AAATC	48,790	4,802	43,988	5,000	5,130	5,263	5,400	5,540	5,684	5,832	5,964	0
Train control rehab	1,300	1,300	0									0
Replace Metro/vison destination signs	1,000	0	1,000	1,000	1,000	1,000	1,000	1,000	1,550	791		0
DTS replacement (initial phase)	16,751	9,350	7,401	1,070	1,000	1,000	1,000	1,000	1,550	791		0
Other controls and communications projects	254,667	137,278	117,389	11,870	22,130	36,263	20,600	6,340	7,234	6,844	6,088	0
Subtotal controls & communications												
Facility Renovation and Replacement- Phase 1	21,511	3,412	18,099	2,000	2,080	2,175	2,225	2,305	2,375	2,424	2,515	0
Repairs inventory (approx. \$2M per yr.)	3,186	3,186	0									0
Hayward Shop traction motor repair facility	1,000	1,000	767	767								0
Employee facility improvements	1,110	1,110	0									0
Richmond Shop & Yard security improvements	3,000	0	3,000					1,000	1,000	1,000		0
Replace shop rolling	13,948	11,104	2,844	2,844								0
Other shop and yard renovation projects	43,715	18,985	24,730	5,631	2,080	2,175	2,225	2,305	3,375	3,424	2,515	0
Subtotal												
Facility Renovation and Replacement- Phase 2	8,010	0	8,010									8,010
Repairs inventory (approx. \$2M per yr.)	51,725	18,985	32,740	5,631	2,080	2,175	2,225	2,305	3,375	3,424	2,515	8,010
Subtotal facility renovation & replacement												

Table 1 (continued)

Track One Program -- Funding Needs (continued)

All figures in thousands of dollars (three decimal places dropped)

Project	Total Cost	Funding to 9/30/98	Funding Req'l.	Fiscal Year Commitment						
				1998	2000	2001	2002	2003	2004	2007-09
SYSTEM RENOVATION PROGRAM (cont'd)										
Work Equipment-Phase 1	36,206	5,828	30,380	4,310	3,150	3,340	3,530	3,720	3,910	4,310
Work equipment projects										
Work Equipment-Phase 2	14,130	0	14,130							14,130
Work equipment projects										
Subtotal work equipment	50,336	5,828	44,510	4,310	3,150	3,340	3,530	3,720	3,910	14,130
SUBTOTAL SYSTEM RENOVATION PROGRAM	1,166,377	616,031	548,346	260,720	45,769	59,485	42,944	28,280	29,422	28,638
EXTENSIONS PROGRAM-Phase 1										
to Colma (FFGA)	170,179	170,179	0							0
to Dublin-Pleasanton	543,050	543,050	0							0
to Pittsburg-Bay Point	1,111,500	1,111,500	0							0
to San Francisco Airport (FFGA)	1,111,500	1,111,500	0							0
to SFO	79,200	4,650	74,550	921,281	2,850	71,700				0
Power substations for SFO	12,500	12,500	0							0
to Warm Springs	262,800	15,700	247,100		4,000		7,900			171,800
Oakland Airport Connector	4,000	0	4,000				0			0
Pittsburg-Bay Point to Railroad Ave	96,000	96,000	0							0
Subtotal Extensions Program	2,784,969	1,538,038	1,246,931	929,281	6,650	75,700	4,500	7,900	11,500	19,900
SEISMIC RETROFIT PROGRAM-Phase 1										
Subtotal Seismic Retrofit Program	22,000	0	22,000	22,000	0	0	0	0	0	0
SERVICE IMPROVEMENT PROGRAM										
Service Improvement Program-Phase 1										
Concord Shop expansion	14,582	1,992	12,590	12,590						0
Anti-graffiti program	580	580	0							0
Bicycle access improvements	704	704	0							0
Transit centers	26,386	25,791	595	565	8,000					0
Shop expansion location TBD	17,000	8,000	9,000							0
Other service improvement/renovations	17,000	10,459	6,541	1,584	5,500					0
Subtotal	87,804	39,565	28,239	14,739	8,000	5,500	0	0	0	0
Service Improvement Program-Phase 2										
Add new bike lockers	500	0	500							0
Fruitvale transit village	3,080	0	3,080							0
Subtotal	3,580	0	3,580	0	0	0	0	0	0	0
Subtotal Service Improvement Program	71,384	42,645	28,739	15,239	8,000	5,500	0	0	0	0
RESEARCH, DEVELOPMENT AND DEMONSTRATION-Phase 1										
Research, development and demonstration projects	4,243	4,243	0							0
Subtotal Research, Development and Demonstration	4,243	4,243	0	0	0	0	0	0	0	0
OTHER FINANCIAL OBLIGATIONS-Phase 1										
Other financial obligations	100,041	99,401	640	80	80	80	80	80	80	80
OTHER FINANCIAL OBLIGATIONS-Phase 2										
Met Center capital reserve	240	0	240							240
Subtotal Other Financial Obligations	100,281	99,401	880	80	80	80	80	80	80	240
TOTAL TRACK ONE FUNDING NEEDS	4,149,254	2,302,358	1,846,896	1,227,320	60,699	140,765	46,524	38,260	42,508	194,160

Table 2

Track One Program -- Proposed Funding Sources

All figures in thousands of dollars (three decimals places dropped).

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
SYSTEM RENOVATION													
Federal Section 3	253,596	239,473	14,123	0	0	0	0	0	4,547	4,706	4,870	0	0
Federal CMAQ/STP (A/B Cars)	30,000	20,000	10,000	0	5,000	5,000	0	0	0	0	0	0	0
State Prop. 108 (A/B Cars)	15,000	15,000	0	0	0	0	0	0	0	0	0	0	0
State TCI (A/B Cars)	1,974	1,974	0	0	0	0	0	0	0	0	0	0	0
MTC bridge tolls (A/B Cars)	24,000	16,000	8,000	4,000	4,000	0	0	0	0	0	0	0	0
Federal Section 9	125,057	17,159	107,898	25,931	10,670	10,946	11,232	11,523	11,822	12,194	12,560	0	0
Unprogrammed 2672	1,169	0	1,169	1,169	0	0	0	0	0	0	0	0	0
Grant Funding per MTC Res. 2672	450,796	309,606	141,190	32,100	19,670	15,946	11,232	11,523	16,370	16,900	17,450	0	0
1995 bond proceeds (Res. 2672)	94,384	94,384	0	0	0	0	0	0	0	0	0	0	0
1998 bond proceeds (Res. 2672)	106,121	63,801	42,320	14,494	16,026	11,800	11,232	11,523	16,370	16,900	17,450	0	0
Total Funding per MTC Res. 2672	651,301	467,791	183,510	46,594	35,696	27,746	11,232	11,523	16,370	16,900	17,450	0	0
1998 bond proceeds	35,524	24,248	11,276	6,766	4,510	0	0	0	0	0	0	0	0
Planned BART 1999 bond proceeds	129,000	0	129,000	129,000	0	0	0	0	0	0	0	0	0
Federal Section 9 (ADA AFC)	1,200	1,200	0	0	0	0	0	0	0	0	0	0	0
DARPA (AATC)	19,500	19,500	0	0	0	0	0	0	0	0	0	0	0
Private sector (AATC)	11,000	11,000	0	0	0	0	0	0	0	0	0	0	0
State STIP (AATC)	33,055	0	33,055	0	33,055	0	0	0	0	0	0	0	0
Federal CMAQ/STP (AATC)	14,045	0	14,045	0	14,045	0	0	0	0	0	0	0	0
Federal CMAQ/STP (Other)	16,000	0	16,000	0	0	0	3,333	3,333	3,333	3,000	3,000	0	0
State STIP (Other)	24,000	0	24,000	0	0	0	5,000	5,000	4,667	4,667	4,667	0	0
State TCI	2,220	2,220	0	0	0	0	0	0	0	0	0	0	0
Non-2672 MTC Bridge Tolls	17,326	0	17,326	0	1,642	1,684	1,728	1,773	3,500	3,500	3,500	0	0
CalTrans Reimbursement	350	0	350	350	0	0	0	0	0	0	0	0	0
AB 434 (bicycle program)	500	0	500	500	0	0	0	0	0	0	0	0	0
Interest earnings	4,549	0	4,549	4,549	0	0	0	0	0	0	0	0	0
Pre 1995-Reserves	74,647	53,262	21,385	5,000	5,000	6,385	5,000	0	0	0	0	0	0
Previous Grants	31,063	31,063	0	0	0	0	0	0	0	0	0	0	0
Previous Grants (ADA AFC)	300	300	0	0	0	0	0	0	0	0	0	0	0
Allocation from Operating (through 2006)	68,597	4,447	64,150	850	2,900	2,200	4,000	10,000	13,000	15,500	15,700	0	0
Allocation from Operating (2007-2009)	22,200	0	22,200	0	0	0	0	0	0	0	0	22,200	0
Allocation from Operating (C-1 Overhaul)	10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000	0	0	0	0	0
SUBTOTAL SYSTEM RENOVATION	1,166,377	618,031	548,347	195,609	98,848	39,015	31,293	32,629	40,870	43,566	44,317	22,200	0

Table 2 (continued)

Track One Program -- Proposed Funding Sources (continued)

All figures in thousands of dollars (three decimals places dropped).

Funding Source	Total Program	Allocated to date	To Be Allocated	Fiscal Year Programmed								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
SERVICE IMPROVEMENT, R&D AND OTHER OBLIGATIONS												
1995 bond proceeds	35,967	35,967	0	0	0	0	0	0	0	0	0	0
1998 bond proceeds	63,954	29,233	34,721	15,450	13,783	0	0	0	0	0	0	0
R&D grants	3,481	0	3,481	0	0	0	0	0	0	0	0	0
Non-2872 grants	38,054	0	38,054	0	0	0	0	0	0	0	0	0
Pre 1995-Reserves	4,014	0	4,014	0	0	0	0	0	0	0	0	0
Allocations from operating budget (through 2006)	7,403	7,403	0	0	0	0	0	0	0	0	0	0
1995 Safe Harbor Lease proceeds	1,646	1,646	0	0	0	0	0	0	0	0	0	0
Long range planning previous BART reserves	4,388	386	4,002	386	0	0	0	0	0	0	0	0
Interest earnings	17,001	17,001	0	0	0	0	0	0	0	0	0	0
SUBTOTAL SERVICE IMPROVEMENT, R&D AND OTHER OBLIGATIONS	175,908	146,289	29,619	15,836	13,783	0	0	0	0	0	0	0
SEISMIC RETROFIT												
Caltrans	22,000	0	22,000	22,000	0	0	0	0	0	0	0	0
SUBTOTAL SEISMIC RETROFIT	22,000	0	22,000	22,000	0	0	0	0	0	0	0	0
EXTENSIONS												
Funding for Colma extension (FFGA)	170,179	170,179	0	0	0	0	0	0	0	0	0	0
Funding for Dublin-Pleasanton extension	543,050	543,050	0	0	0	0	0	0	0	0	0	0
Funding for Pittsburg Bay Point extension	505,740	505,740	0	0	0	0	0	0	0	0	0	0
Funding for San Francisco Airport extension	1,111,500	190,219	921,281	921,281	0	0	0	0	0	0	0	0
Dedicated bond issue for SFO CAPRA	71,700	0	71,700	0	71,700	0	0	0	0	0	0	0
Allocations from Operating for SFO CAPRA	7,500	4,650	2,850	2,850	0	0	0	0	0	0	0	0
1998 Bond proceeds (Power Substation for SFO)	12,500	12,500	0	0	0	0	0	0	0	0	0	0
Funding for Warm Springs extension	282,800	15,700	247,100	4,000	4,000	4,000	4,500	7,900	11,500	19,900	19,500	171,900
Funding for Oakland Airport Connector	4,000	0	4,000	4,000	0	0	0	0	0	0	0	0
Existing Measure C funding Bay Point to Railroad Ave. extension	96,000	96,000	0	0	0	0	0	0	0	0	0	0
SUBTOTAL EXTENSIONS	2,764,969	1,538,038	1,246,931	1,111,339	10,000	27,850	78,500	10,000	10,000	10,000	10,000	818,990
TOTAL TRACK ONE PROGRAM	4,149,254	2,302,358	1,846,897	1,344,784	122,831	66,865	109,793	42,829	50,870	53,566	54,317	841,190

Chapter 4

PROJECT LISTINGS: FUNDING NEEDS AND PRIORITIES

shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I. SYSTEMWIDE RENOVATION PROGRAM

I-A. Rolling Stock Renovation (Track One)

	Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Track 1, Phase 1 Projects												
Replace A- & B-car door components	4,688	4,688	0									0
Replace electrical couplers on C1-cars	2,200	2,200	0									0
Replace batteries on A-, B-, and C1-cars	1,900	1,900	0									0
Wheel upgrade program	2,026	2,026	0									0
A- & B- car renovation *	454,400	300,717	153,683	153,683								0
Subtotal Phase 1	465,214	311,531	153,683	153,683	0	0	0	0	0	0	0	0
Track 1, Phase 2 Project												
C-1 car ten-year overhaul	10,000	3,000	7,000	2,000	2,000	1,000	1,000	1,000				0
* "Funding to date" includes all programmed federal, state, bridge toll, and BART funds as follows: \$239,472,500 in Sec. 3, \$20,000,000 in CMAQ, \$1,973,500 in TCI, \$15,000,000 in Prop. 108 bonds, \$16,000,000 in bridge tolls, and \$8,271,000 in BART funds.												
Total Track One	475,214	314,531	160,683	155,683	2,000	1,000	1,000	1,000	0	0	0	0

I-A. Rolling Stock Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd
Priority 1			
C1-car renovation	265,000	0	265,000
Fleet upgrades	15,000	0	15,000
Priority 2			
Install automatic train control restoration units (ARU)	2,500	0	2,500
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	282,500	0	282,500

Category Total (both tracks)	757,714	311,531	446,183
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

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shading indicates project active in FY99
c indicates completed project
All figures in thousands of dollars (three decimals places dropped).

I-B. Mainline Renovation (Track One)												
	Total Cost	Funding to 6/30/98	Funding Req'd.	Fiscal Year Commitment							2007-09	
				1999	2000	2001	2002	2003	2004	2005		2006
Track 1, Phase 1 Projects												
c Track embankment upgrade	243	243	0									0
c BHT fire protection mods	1,895	1,895	0									0
c TBT cathodic corrosion protection	3,328	3,328	0									0
c Replace dry with wet standpipes	8,927	8,927	0									0
c Recoat steel tunnel liner rings	586	586	0									0
c R-Q-W fencing	458	458	0									0
c Caltrans reimbursable projects	3,097	3,097	0									0
Caltrans reimbursable (1-880 support)	350	350	0									0
Repaint girders & bridges	2,012	2,012	0									0
Replace sump pumps in subway tunnels	3,306	3,306	0									0
Replace rail	37,012	10,559	26,453	3,061	3,078	3,158	3,240	3,324	3,410	3,529	3,653	0
Rehab traction power equipment	27,655	10,000	17,655						5,684	5,863	6,088	0
Rehab subway vent fans	1,337	1,337	0									0
Emergency mainline repairs	11,514	0	11,514	3,000	3,000	3,000	2,514					0
Traction power house roofs	420	143	277	277								0
Asbestos abatement	5,260	5,260	0									0
Total Track One	107,400	51,501	55,899	6,338	6,078	6,158	5,754	3,324	9,094	9,412	9,741	0

I-B. Mainline Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd
Priority 1			
Additional traction power system renovation	50,000	0	50,000
Transbay Tube cathodic protection	5,000	0	5,000
Lake Merritt Channel subway repair	2,000	0	2,000
Repaint steel girders (Phase 3)	1,000	0	1,000
Tunnel ventilation- systemwide (Phase 2)	2,000	0	2,000
Subtotal	60,000	0	60,000
Priority 2			
Remove gaps in handrail along emergency walkways	2,000	0	2,000
T&T fan and main damper control improvements	3,000	0	3,000
Add elect. insulation at various locations (trackway)	300	0	300
Subtotal	5,300	0	5,300
Priority 3			
Dry standpipes at I-680 and Springbrook crossings	370	0	370
Subtotal	370	0	370
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	65,670	0	65,670

Category Total (both tracks)	173,070	51,501	121,569
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NOTES:

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shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-C. Stations Renovation (Track One)													
		Fiscal Year Commitment											
		Total Cost	Funding to 6/30/98	Funding Req'd	1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Track 1, Phase 1 Projects													
c	Repair LMS concrete roof	215	215	0									0
c	Replace security gates at some stations	34	34	0									0
c	12th Street elevator replacement	900	900	0									0
c	Replace station fire alarms	350	350	0									0
c	Replace four Embarcadero escalators	2,777	2,777	0									0
c	Replace floors on ten elevators	510	510	0									0
c	ADA informational signage	470	470	0									0
c	ADA informational signage	4,228	4,228	0									0
c	Stations security program	330	330	0									0
c	Agent ticket reader	925	925	0									0
c	Modify change machines	772	772	0									0
c	Cubic faregate mods	1,064	1,064	0									0
c	Add faregates from storage at var. stations	1,500	1,500	0									0
c	ADA AFC	72	72	0									0
c	Blit-to-bill changer prototype	250	250	0									0
c	Replace fire mains at three stations	597	597	0									0
c	Replace and add bike lockers	364	364	0									0
c	MacArthur Station emergency egress improvement	28,040	25,540	2,500	2,500								0
c	Escalator overhaul	12,121	12,121	0									0
c	Replace 19 station escalators	251	251	0									0
c	Ogawa Plaza Project	10,395	6,409	4,186	4,186								0
c	Elevator overhaul	452	452	0									0
c	ADA Key Station	922	922	0									0
c	Remove architectural barriers	1,713	1,713	0									0
c	Replace bus transfer ticket machines	3,408	3,408	0									0
c	Energy conservation (Embarcadero Station)	77,776	3,620	74,156	53,552	5,201	5,286	4,435	4,051	1,631			0
c	Credit-debit vendor	4,320	2,320	2,000	2,000								0
c	AFC modernization/Translink	1,485	1,485	0									0
c	Interim AFC upgrades	870	870	0									0
c	Replace station signage	1,350	480	870	870								0
c	ADA parking modifications (Key Sta.)	13,140	13,140	0									0
c	Eight stations, general renovation	6,353	290	6,063	6,063								0
c	Four stations, general renovation	1,034	920	114	114								0
c	Replace station roofing	1,344	1,021	323	323								0
c	Repair platform subsurfaces	7	7	0									0
c	Replace platform edge tile	43,833	0	43,833	5,000	5,130	5,263	5,400	5,540	5,684	5,832	5,984	0
c	Future general stations renovation	800	0	800					800				0
c	West Oakland Inlet structures												0
Subtotal		224,765	89,910	134,845	74,608	10,331	10,549	9,835	10,391	7,315	5,832	5,984	0
Trk. 1, Phase 1 -- New Projects													
c	Access Upgrade: MacArthur Sta. elev.	300	0	300	300								0
c	Access Upgrade: parking modifications (non-Key Sta.)	630	0	630	630								0
c	Access Upgrade: AFC swing gates and related	350	0	350	350								0
c	Access Upgrade: electronic elevator signs	400	0	400	400								0
c	Access Upgrade: misc. bathroom remodeling	400	0	400	400								0
c	Access Upgrade: bathroom & elevator directional signs	200	0	200	200								0
Subtotal		2,280	0	2,280	2,280	0	0	0	0	0	0	0	0
Total Track One		227,035	89,910	137,125	76,888	10,331	10,549	9,835	10,391	7,315	5,832	5,984	0

I-C. Stations Renovation (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd
Priority 1			
General station renovation	30,000	0	30,000
Replace platform edge detectable warning system at 20 sta.	5,500	0	5,500
MacArthur Sta. elevator replacement (net additional)	2,000	0	2,000
AFC expansion	30,000	0	30,000
Add security impriv1 at 8 downtown stations	35,000	0	35,000
Replace Stewart-Warner signheads	5,000	0	5,000
Resurface parking lot pavement	12,000	0	12,000
Replace station P.A., platform CCTV, security CCTV	4,200	0	4,200
Remote sensor elevator/escalator for Extensions stas.	450	0	450
Station reroofing	5,625	0	5,625
Rehab. garage and other elevators (LMA)	3,000	0	3,000
Subtotal	132,775	0	132,775
Priority 2			
Energy conservation	21,190	0	21,190
Replace North Berkeley Station ceiling	1,000	0	1,070
AFC (IBM) compressor replacement	500	10	580
AFC upgrades to SIG equip. software & electronics	4,000	0	4,000
Replace hydraulic lift cylinders	4,000	0	4,000
Subtotal	30,690	0	30,640
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	163,615	0	163,615

Category Total (both tracks)	390,650	89,910	300,740
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NOTES:

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shading indicates project active in FY99

C indicates controlled project

All figures in thousands of dollars (three decimals places dropped)

I-D. Controls & Communications Renovation (Track One)

Track 1, Phase 1 Projects												
	Total Cost	Funding to 6/30/98	Funding Rec'd.	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
C Reverse running in TBT	180	180	0									0
C Emergency control center back-up	29	29	0									0
C Train ID enhancement	1,590	1,590	0									0
C Yard train control improvements	1,946	1,946	0									0
C Cash handling improvements	1,207	1,207	0									0
C Replace MVDDs	373	373	0									0
C Train control rehab	48,790	4,802	43,988	5,000	5,130	5,263	5,400	5,540	5,684	5,883	6,088	0
Fiber optic/radio network (TRACS)	65,000	65,000	0									0
AATC	102,600	37,600	65,000	5,600	15,000	30,000	14,200					0
Automated Police dispatch	438	438	0									0
Comspec position in Central	265	195	70	70								0
Replace workstation consoles in Central	1,187	1,187	0									0
Replace MetroVision destination signs	1,300	1,300	0									0
NXTGEN *	19,226	19,226	0									0
MIS mainframe computer	600	600	0									0
Replace MARIS	1,615	1,615	0									0
DTS replacement (initial phase)	1,000	1,000	1,000									0
Yard cable plant replacement	550	0	550									0
Emergency repairs	6,781	0	6,781	1,000	1,000	1,000	1,000	1,000	550	781		0
* Does not include portions funded in extensions budgets.												
Total Track One	254,667	137,278	117,389	11,870	22,130	36,263	20,600	6,540	7,234	6,664	6,088	0

I-D. Controls & Communications Renovation (Track Two)			
	Total Cost	Funding to 8/30/98	Funding Req't.
Priority 1			
Install AATC on remainder of core system, AURICK lines	45,000	0	45,000
Install AATC complimentary technology, broken rail detection	20,000	0	20,000
Install AATC complimentary technology, program stop	5,000	0	5,000
Central computer system software development, AATC support	10,000	0	10,000
Replacement of interlocking relay-based logic	4,000	0	4,000
DTS replacement (balance of system)/Systemwide cable plant	5,000	0	5,000
Operations computer replacement	8,000	0	8,000
Wayside wiring for interlocking replacement underground	5,000	0	5,000
Telephone switch replacement (19 locations)	4,000	0	4,000
Network hardware & software upgrades (replacements)	9,000	0	9,000
Richmond & Daly City Yard console replacement	2,400	0	2,400
AVI readers at yards & other locations	4,000	0	4,000
Subtotal	121,400	0	121,400
Priority 2			
Install new systems, yard, shop & tower data network	1,600	0	1,600
Replace yard voice recorders	500	0	500
AATC on CSX/DPX/PAX/SFO lines	27,000	0	27,000
Subtotal	29,100	0	29,100
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	150,500	0	150,500

Category Total (both tracks)	405,347	137,278	268,069
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NOTES:
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shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-E. Facility Renovation and Replacement (Track One)

	Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment									
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09	
Track 1, Phase 1 Projects													
c Replace Hayward Shop fire main	238	238	0										0
c Replace Hayward wheel press	544	544	0										0
c Replace shop parts washers (funded portion)	263	263	0										0
c Yard fuel tanks	38	38	0										0
c Richmond Yard efficiency improvements	353	353	0										0
c Emergency Richmond Shop roof repairs	98	98	0										0
c Wheel truing machines	3,590	3,590	0										0
c Wheel/rail maintenance study	123	123	0										0
c Central receiving & distribution facility study	10	10	0										0
c Hayward Shop traction motor repair facility	3,186	3,186	0										0
c Replace dust collector systems at Rich. & Conc.	1,646	1,646	0										0
c Richmond oil/water separator tanks	136	136	0										0
c Transit vehicle washer	1,538	538	1,000	1,000									0
c Richmond Shop & Yard security improvements	1,070	1,070	0										0
c Transfer track crossings	360	360	0										0
c Reconfigure Transportation Bldgs.	3,395	2,295	1,100	1,100									0
c CHB security improvements	19	19	0										0
c Replace Met Center fuel tank	675	675	0										0
c Hayward test track security	108	108	0										0
c 1,000 volt shop power supplies	534	70	464	464									0
c Employee facility improvements	1,000	213	787	787									0
c Replace parts washers (unfunded portion)	280	0	280	280									0
c Repairables inventory (approx. \$2M per yr.)	21,511	3,412	18,099	2,000	2,080	2,175	2,225	2,305	2,375	2,424	2,515		0
c Replace shop roofing	3,000	0	3,000					1,000	1,000	1,000			0
Subtotal	43,715	18,985	24,730	5,631	2,080	2,175	2,225	3,305	3,375	3,424	2,515		0
Track 1, Phase 2 Project													
Repairables inventory (approx. \$2M per yr.)	8,010	0	8,010										8,010
Total Track One	51,725	18,985	32,740	5,631	2,080	2,175	2,225	3,305	3,375	3,424	2,515		8,010

I-E: Facility Renovation and Replacement (Track Two)			
Priority 1	Total Cost	Funding to 8/30/98	Funding Req't.
Add storage facilities (includes new central stores warehouse)	7,500	0	7,500
Reroofing shops & other District facilities	2,000	0	2,000
Overhead cranes -- recondition	1,500	0	1,500
Car wash facility replacement at Richmond & Hayward	7,000	0	7,000
Rehabilitation of TransBay Tube facility	1,000	0	1,000
Subtotal	19,000	0	19,000
Priority 2			
Lake Merritt Building renovation	7,000	0	7,000
Replace shop roll-up doors (Rich, Hay, Conic, Oak)	1,250	0	1,250
Replace yard disconnect enclosures	620	0	620
Recondition shop/yard sump pumps	260	0	260
Paint and repair facility	2,000	0	2,000
Train operator training simulator	1,000	0	1,000
Resurface road/parking and relamp shop/yard exterior lights	310	0	310
Replace grease/oil facilities	160	0	160
Storage area canopy, lighting and office at Richmond Shop	180	0	180
Replace Oakland Shop fuel facility	1,000	0	1,000
Subtotal	13,780	0	13,780
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	32,780	0	32,780

Category Total (both tracks)	84,505	18,985	65,520
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NOTES:

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shading indicates project active in FY99

c. indicates completed project

All figures in thousands of dollars (three decimals places dropped).

I-F. Work Equipment (Track One)											
	Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment							
				1999	2000	2001	2002	2003	2004	2005	2006
Track 1, Phase 1 Projects											
<u>On-going projects 1995-2006</u>											
Automotive-type vehicles (\$1.2M per yr.)	13,545	1,145	12,400	1,200	1,300	1,400	1,500	1,600	1,700	1,800	0
M&E equipment (approx. \$200K per yr.)	2,483	523	1,960	210	220	230	240	250	260	270	280
Miscellaneous	143	143	0								0
Non-Ops depts. eqpmnt. (\$100K per yr.)	1,180	100	1,080	100	110	120	130	140	150	160	170
Non-revenue rail vehicles (\$850K per yr.)	10,075	2,125	7,950	850	890	930	970	1,010	1,050	1,100	1,150
Other Ops depts. eqpmnt. (\$100K per yr.)	1,294	214	1,080	100	110	120	130	140	150	160	170
PC equipment (\$500K per yr.--300 machines)	6,136	1,576	4,560	500	520	540	560	580	600	620	640
ADA Equipment	350	0	350	350							0
Subtotal	35,206	5,826	29,380	3,310	3,150	3,340	3,530	3,720	3,910	4,110	4,310
Track 1, Phase 1 -- New Project											
Currency counter replacement	1,000	0	1,000	1,000							0
Subtotal Phase 1	36,206	5,826	30,380	4,310	3,150	3,340	3,530	3,720	3,910	4,110	4,310
Track 1, Phase 2 Projects											
<u>On-going projects 2007-2009</u>											
Automotive-type vehicles (\$1.2M per yr.)	6,300	0	6,300								6,300
M&E equipment (approx. \$200K per yr.)	900	0	900								900
Non-Ops depts. eqpmnt. (\$100K per yr.)	570	0	570								570
Non-revenue rail vehicles (\$850K per yr.)	3,750	0	3,750								3,750
Other Ops depts. eqpmnt. (\$100K per yr.)	570	0	570								570
PC equipment (\$500K per yr.--300 machines)	2,040	0	2,040								2,040
Subtotal Phase 2	14,130	0	14,130	0	0	0	0	0	0	0	14,130
Total Track One	50,336	5,826	44,510	4,310	3,150	3,340	3,530	3,720	3,910	4,110	4,310

I-F. Work Equipment (Track Two)			
	Total Cost	Funding to 6/30/96	Funding Req't.
Total Track Two	0	0	0

Category Total (both tracks)	50,336	5,826	44,510
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NOTES:

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shading indicates project active in FY99
c indicates completed project
All figures in thousands of dollars (three decimals places dropped).

II. Extensions (Track One)		Fiscal Year Commitment											
Track 1, Phase 1 Projects		Total Cost	Funding to 6/30/98	Funding Req'd.	1999	2000	2001	2002	2003	2004	2005	2006	2007-09
c	to Colma (FFGA) (1)	170,179	170,179	0									
c	to Dublin-Pleasanton (1)	543,050	543,050	0									
c	to Pittsburg-Bay Point (1)	505,740	505,740	0									
c	to San Francisco Airport (2)	1,111,500	190,219	921,281	921,281								
	SFO CAPRA (3)	79,200	4,650	74,550		2,850	71,700						
	Power substations for SFO	12,500	12,500										
	to Warm Springs (4)	262,800	15,700	247,100	4,000	4,000	4,000	4,500	7,900	11,500	19,900	19,500	171,800
	Oakland Airport Connector (4)	4,000	0	4,000	4,000								
	Pittsburg-Bay Point to Railroad Ave. (4)	96,000	96,000	0									
	Total Track One	2,784,969	1,538,038	1,246,931	929,281	6,850	75,700	4,500	7,900	11,500	19,900	19,500	171,800

1

"Total Cost" shown is programmed funding. Actual final cost to be determined upon financial close-out of projects.

2

FTA approved funding plan includes \$750M total from FTA (\$114M has been appropriated to date), \$99M total from the Amendment to the BART-Sam Trans Agreement (\$10.3M has been appropriated to date), \$165.5M total in state funds (\$61M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$4.4M received to date) and \$87M from the S.F. Airport itself.

3

Capital Reserve Account for grant-eligible expenses of S.F. Airport Extension

4

Track One portion of project, for which potential funding sources can be identified. See additional increment in Track Two below.

- 1 "Total Cost" shown is programmed funding. Actual final cost to be determined upon financial close-out of projects.
- 2 FTA approved funding plan includes \$750M total from FTA (\$114M has been appropriated to date), \$99M total from the Amendment to the BART-San Trans Agreement (\$10.3M has been appropriated to date), \$165.5M total in state funds (\$61M appropriated to date), \$10M in MTC-allocated bridge toll revenue (\$4.4M received to date) and \$87M from the S.F. Airport itself.
- 3 Capital Reserve Account for grant-eligible expenses of S.F. Airport Extension.
- 4 Track One portion of project, for which potential funding sources can be identified. See additional increment in Track Two below.

II. Extensions (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req't.
Priority 2			
Pittsburg-Bay Point to Railroad Ave. (6)	104,100	0	104,100
Warm Springs extension additional grants	283,300	0	283,300
Oakland Airport Connector other grants	125,900	0	125,900
West Dublin/Pleasanton station	39,370	0	39,370
Power substation for DPX	3,800	0	3,800
Subtotal	556,470	0	556,470
Phase 2 and 3 Extensions			
to Antioch	TBD	0	TBD
through West Contra Costa			
to Livermore			
within San Francisco			
through San Ramon Valley Corridor			
to Santa Clara County			
Commuter Rail (7)	TBD	0	TBD
Subtotal	TBD	0	TBD
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	556,470	0	556,470

⁶ Cost in 1996 dollars. Will be updated when a funding plan and implementation schedule can be finalized.

⁷ BART is studying possible commuter rail service in numerous corridors in the greater Bay Area, and the State has approved BART management of the Capitol Corridor service extending from San Jose to Sacramento. Service plans and costs will be evaluated in BART's Strategic Planning exercise currently underway, and in light of BART's Extension Staging Policy.

Category Total (both tracks)	3,341,439	1,538,038	1,803,401
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NOTES:

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■ shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

III. Seismic Retrofit Program (Track One)												
	Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment								
				1999	2000	2001	2002	2003	2004	2005	2006	2007-09
Track 1, Phase 1 Projects												
Seismic lifeline project	22,000	0	22,000	22,000								
Total Track One	22,000	0	22,000	22,000	0	0	0	0	0	0	0	0

III. Seismic Retrofit Program (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd.
Priority 1			
Seismic retrofit of aerial structures - Phase 1	228,000	0	228,000
Upgrade seismic sensors systemwide	500	0	500
Subtotal	228,500	0	228,500
Priority 2			
Seismic rack anchors & vehicle support tie-downs	400	0	400
Phase 2 Seismic Program (aerial and underground stations)	60,000	0	60,000
Seismic program for shops & computer anchoring	7,000	0	7,000
Subtotal	67,400	0	67,400
<i>All Track Two project cost estimates are conceptual, for planning purposes only.</i>			
Total Track Two	295,900	0	295,900
Category Total (both tracks)			
	317,900	0	317,900

NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY99
c indicates completed project
All figures in thousands of dollars (three decimals places dropped).

IV. Service Improvements (Track One)													
Track 1, Phase 1 Projects		Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment								
					1999	2000	2001	2002	2003	2004	2005	2006	2007-09
c	BayFair transit center	1,000	1,000	0									0
c	Hayward transit center operational facility	1,282	1,282	0									0
c	Walnut Creek transit center	2,930	2,930	0									0
c	Concord transit center	1,649	1,649	0									0
c	Pittsburg park/ride	1,656	1,656	0									0
c	Daly City transit center	7,504	7,504	0									0
c	Anti-graffiti program	580	580	0									0
c	System Capacity Study	784	575	209	209								0
c	Fruitvale transit center	2,645	2,645	0									0
c	Coliseum transit center	732	732	0									0
c	Hayward transit center canopies	1,248	900	348	348								0
c	South Hayward transit center	1,123	1,123	0									0
c	Union City transit center	2,313	2,313	0									0
c	Fremont transit center	2,897	2,897	0									0
c	PI Hill park/ride for I-680/24 mitigation	879	879	0									0
c	Concord Shop expansion	14,562	1,992	12,590	12,590								0
c	El Cerrito Plaza transit center	420	420	0									0
c	Richmond transit center	1,678	1,678	0									0
c	West Oakland transit center	217	0	217	217								0
c	System access planning & monitoring	1,040	756	284	284								0
c	Pathfinder sign program prototype	230	230	0									0
c	Bicycle access improvements	704	704	0									0
c	Station area development planning (Jt. Dev.)	1,823	1,118	705	705								0
c	Long range planning	4,388	4,002	386	386								0
c	El Cerrito Plaza access and sta. area impr't.	5,500	0	5,500			5,500						0
c	Shop expansion location TBD	8,000	0	8,000			8,000						0
	Subtotal	67,804	39,565	28,239	14,739	8,000	5,500	0	0	0	0	0	0
Trk. 1, Phase 2 -- New Project													
c	Add'l new bike lockers	500	0	500	500								0
c	Fruitvale transit village	3,080	3,080	0									0
	Subtotal	3,580	3,080	500	500								0
	Total Track One	71,384	42,645	28,739	15,239	8,000	5,500	0	0	0	0	0	0

IV. Service Improvements (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd.
Priority 2			
Additional Capacity Enhancement Program *	1,000,000	0	1,000,000
Mission St. stations area improvements	TBD	0	TBD
Pathfinder signs further implementation	500	0	500
Subtotal	1,000,500	0	1,000,500
Priority 3			
West Oakland access and station area improvements	TBD	0	TBD
Fruitvale access and station area improvements	TBD	0	TBD
Union City access and station area improvements	TBD	0	TBD
Rockridge access and station area improvements	TBD	0	TBD
Subtotal	0	0	0
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	1,000,500	0	1,000,500

*Includes additional revenue vehicles; additional traction power and train control rehabilitation and upgrades; other reliability improvements; improved station circulation and access; additional crossovers and storage tracks; and further expansion of maintenance shop and storage yard facilities.

Category Total (both tracks)	1,071,884	42,645	1,029,239
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

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shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped)

V. Research, Development and Demonstration (Track One)											
	Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment							
				1999	2000	2001	2002	2003	2004	2005	
Track 1, Phase 1 Projects											
Electric Station Cars demonstration	1,440	1,440	0								0
Electric vehicle charging kiosk demonstration	1,100	1,100	0								0
Superconducting Magnetic Energy Storage	468	468	0								0
Adaptive diagnostic systems	123	123	0								0
Sound mitigation/noise reduction program	350	350	0								0
R&D program	762	762	0								0
Total Track One	4,243	4,243	0	0	0	0	0	0	0	0	0

V. Research, Development and Demonstration (Track Two)			
	Total Cost	Funding to 6/30/98	Funding Req'd.
Priority 2			
Sound mitigation/noise reduction program (additional)	TBD	0	TBD
Adaptive diagnostic systems (additional)	0	0	0
Superconducting Magnetic Energy Storage (additional)	0	0	0
Traction power optimization	TBD	0	TBD
Other	TBD	0	TBD
All Track Two project cost estimates are conceptual, for planning purposes only.			
Total Track Two	0	0	0

Category Total (both tracks)	4,243	4,243	0
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NOTES:

All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.

shading indicates project active in FY99

c indicates completed project

All figures in thousands of dollars (three decimals places dropped).

VI. Other Financial Obligations (Track One)													
		Total Cost	Funding to 6/30/98	Funding Req't.	Fiscal Year Commitment								
					1999	2000	2001	2002	2003	2004	2005	2006	2007-09
<u>Track 1, Phase 1 Projects</u>													
C-2 car bonds, A/B float cars, Daly City reserves, proj. dev.		100,041	99,401	640	80	80	80	80	80	80	80	80	0
<u>Track 1, Phase 2 Projects</u>													
Met Center capital reserve		240	0	240									240
Total Track One		100,281	99,401	880	80	80	80	80	80	80	80	80	240

VI. Other Financial Obligations (Track Two)			
Priority 2	Total	Funding to 6/30/98	Funding Req't.
	Cost		
Total Track Two	0	0	0

Category Total (both tracks)	100,281	99,401	880
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All figures in thousands of dollars (three decimal places dropped), showing the fiscal year in which funding needs to be programmed, in order to be committed to project contracts.

All figures calculated on a base of project cost in calendar year 1996 dollars, escalated at three percent per year.



